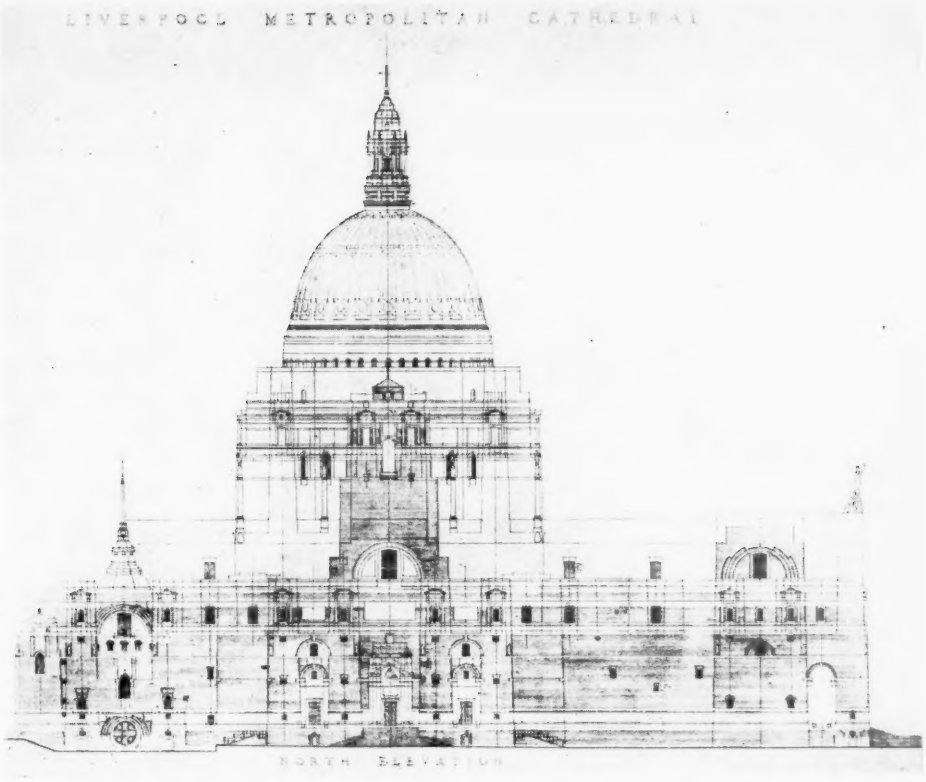

Liverpool Cathedral, by Sir Edwin Lutyens. "Are those inscrutable drawings a magic formula by means of which unutterable things may yet be brought to expression, or are they merely the point de départ *for what, had he lived, would have been a progressive act of faith?"*

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Journal

On Tuesday, 13 February, the R.I.B.A. had more of the look of its old pre-war self than on any occasion since the war began. Captain Goodhart-Rendel's paper on Lutyens brought a large audience of young and old, architects and laymen, to enjoy forty minutes of finely-wrought critical appreciation, a treat for mind and ear such as can rarely have been experienced by any of those present. We will print the paper with a large number of illustrations, the vote of thanks by the Duke of Wellington [*F.*] and Mr. W. H. Ansell and the discussion that followed in the March JOURNAL.

COST OF WORKS PAYMENTS FOR WAR DAMAGE TO HISTORIC BUILDINGS

A number of buildings of special architectural or historic importance have suffered damage in the air raids on this country. The question of their treatment under the War Damage Act has formed the subject of discussion between the War Damage Commission and other appropriate bodies, and the general policy to be observed is now set out in a new Direction which the Treasury has issued under Section 20(1) of the War Damage Act.

Under this Direction it is laid down that, in the public interest,

payments in respect of war damage to buildings which the Commission is satisfied are of special architectural or historic importance shall be of such kind as to secure, so far as possible, the preservation of the character of such buildings. Accordingly, the Commission is authorised, in suitable cases, to make a cost of works payment for the repair of the building where this can be done without detracting from its character, even though it might, technically, be regarded as a total loss under the provisions of the Act and therefore subject only to a value payment.

Any submission that a building should be dealt with under the terms of this Direction must first be made to the War Damage Commission, which will consult with the Minister of Town and Country Planning (in Scotland the Secretary of State) and the Minister of Works, and where necessary inquire from the Royal Fine Art Commission (or the Royal Fine Art Commission of Scotland) whether it is prepared to certify that the building is of sufficient merit to justify the application of the Direction. The duty is laid upon the Commission of satisfying itself that all necessary consents have been obtained for the works of making good the war damage, and of ascertaining that the exercise of the powers in any particular case will not involve injustice to any person interested in the question of the kind of payment to be made.

New R.I.B.A. Award in Town Planning

R.I.B.A. Distinction in Town Planning

The R.I.B.A. have instituted the R.I.B.A. Distinction in Town Planning, which is obtainable by Fellows, Associates (who are not less than 26 years of age) and Licentiates. The test by means of which this Distinction is awarded will be conducted by special Examiners appointed by the Council of the R.I.B.A.

This new award does not take the place of the R.I.B.A. Diploma in Town Planning, which is obtainable by Fellows, Associates and Licentiates of the R.I.B.A. without any minimum age limit.

The primary purpose of the new award is to satisfy a demand from senior architects to take a qualifying test in town planning suited to their age and existing attainments.

The Examiners will meet three times a year—in February, May and October. Applications should be submitted to the Acting Secretary of the R.I.B.A. by 1 January, 1 April and 1 September, annually.

Copies of the form of application containing the procedure, regulations, general scope of study and bibliography may be obtained, free, on application to the Acting Secretary, R.I.B.A.

Members Serving With The Forces

KILLED

Hicks, T. C. G. [*A.*], Lieut. Engineers Section A.I.F.
Wiseman, R. H. [*S.*], Lieut. R.E.

MISSING

Woodnoth, H. W., D.S.C. [*S.*], Sub-Lieut. R.N.V.R.

PRISONERS OF WAR

Heggie, Maurice, Junr. [*S.*], Capt. R.E. (Airborne).
Ward, Raymond J. [*S.*], S/Sgt. Glider Regt. Army Air Corps.

DECORATIONS AND DISTINCTIONS

Browning, R. H. [*A.*]. Mentioned in Despatches.
Comper, J. B. S. [*F.*], Sqdn. Ldr. R.A.F. Mentioned in Despatches.
Jenkinson, A. D. P. [*A.*], Lieut. R.E. Mentioned in Despatches.
Rennie, Robert [*A.*], Capt. R.A. Mentioned in Despatches.
Sawyer, P. R., M.C. [*S.*], Major Hampshire Regt. Mentioned in Despatches.
Scadding, E. F. [*S.*], W.O., R.A.F. Mentioned in Despatches.
Shaw, Robert [*A.*], Major R.E. Awarded M.B.E.
Turnbull, Robert [*S.*], Capt. R.E. Awarded a Certificate of Meritorious Service.
Warland, A. W. [*A.*], Capt. R.E. Mentioned in Despatches.

NO LONGER IN THE FORCES

Dewing, F. M. [*A.*], R.A.F. Scott, A. D. [*A.*], Capt. R.E.
Hayes, A. J. [*L.*], Major R.E. Tasker, E. C. [*F.*], Lieut. Pioneer Corps.
Myers, Denys [*A.*], S/Sgt. R.E.
Pooley, F. B. [*A.*], Capt. R.E. Ward, W. L. [*A.*], A.C. R.A.F.

The President Honoured by Portuga

The President has been elected an Honorary Member of the National Syndicate of Architects of Portugal.

Architectural Publications from Liberated Europe

Through the kindness of the distinguished French architect, Marcel Lods, the Library has received a complete set of the Journal *Techniques et Architecture* which was published in France during the occupation and under Nazi tutelage. The issues date from September-October 1941 to March-April 1944. In all sixteen issues were published. The German policy in the countries they occupied was to encourage the publication of technical journals largely as a means of drawing technical men into their fold. *Techniques et Architecture* was modelled on the famous pre-war French journal *L'Architecture d'Aujourd'hui*, which was suppressed and its fine editor Pierre Vago put for a time in a concentration camp.

The individual issues of *Techniques et Architecture* are noted in the Review of Periodicals. Except for one issue in March-April 1943 illustrating recently completed buildings all the issues are monographs—almost entirely retrospective—on special subjects and types of buildings such as sports buildings, roads and bridges, swimming baths, rural industries and farms, masonry, reinforced concrete, glass, local techniques and materials—the emphasis on fresh open-air rural life will be noticed! Each issue is prefaced by architectural aphorisms by A. G. Perret.

The library has an important duty to collect war-time European publications, however unsavoury their functions as Nazi tools; already we have received help from architects in liberated countries in collecting this special war-publications section of the library. Corporal Gerald Nodes, who some months ago gave the Library a war-time book by le Corbusier which he had bought in Algiers, has now sent the R.I.B.A. copies of the first five issues of an Italian periodical published in Rome: *Quaderni di Architettura: collezione di progetti di construzione edili*. All but issue No. 1 are dated 1944. Each consists of about 16 pages of plans, views and photographs of executed buildings and projects for buildings—most of them are simple schemes for working-class houses and flats.

The Institute's Appeal

The following is the twenty-seventh list of donations received up to 30 December 1944 in response to the appeal issued to all members and honorary members and students on 16 December 1938.

Members who are contemplating making an increased payment of subscription, whereby the amount of the increase will be payable to the appeal fund, are reminded that if they are prepared to enter into an agreement for the payment of such increased subscription for a period of seven years or more they will be entitled to deduct income tax at the standard rate from the amount by which the subscription is increased.

Full particulars were published in the issue of the Journal for 6 February 1939 and can be obtained on application to the Acting Secretary, R.I.B.A.

Donations	£	s.	d.
"Anonymous"	2	2	0
Harry Barrett [*A.*], second donation	3	3	0
D. L. Bridgwater [*F.*]	3	3	0
F. M. Cashmore [*F.*], third and fourth donations	6	6	0
A. W. R. Kendrick [*A.*] sixth donation	1	1	0
L. B. Phillips [*A.*], third donation	1	1	0
H. Salonika [*L.*], fourth donation	2	0	0
Additional Subscriptions			
J. A. Godfrey [*Student*]	1	1	0
H. Overnell [*A.*]	4	4	0
C. Bertram Parkes [*L.*]	1	1	0
B. H. T. Rodd [*L.*]	6	6	0
Chas. M. Swannell [*F.*]	6	6	0
Donations from R.I.B.A. Allied Societies			
Norfolk and Norwich Association of Architects (rebate of members' subscriptions for 1944)	15	13	3
Northants, Beds and Hunts Association of Architects (rebate of members' subscriptions for 1944)	20	14	9
East Africa Institute of Architects (rebate of members' subscriptions for 1944)	4	4	0

The donations and increased subscriptions or contributions received and promised and interest on investments up to 22 December 1944 represent a total of £8,295 16s. 6d. This amount does not include increase of subscriptions or contributions promised for which no definite period is stated.

AN AMERICAN LOOKS AT BRITISH HOUSING

A PAPER READ AT THE ROYAL INSTITUTE OF BRITISH ARCHITECTS ON 2 JANUARY 1945 by

JACOB CRANE

Director of Urban Development, U.S. National Housing Agency

I am glad of the opportunity to brief my impressions of the past eight weeks in this country. But I am a little hesitant because I can be fairly accused of trying to play the rôle of what we call the "sixty-day wonder"—the foreign observer who tries to reach conclusions in the course of a couple of months.

It has been made possible for me to discuss your problems with the four principal British Ministries in this field, with the corresponding Scottish and Welsh officers, with many people outside of government and, most important, with key figures in some twenty local governments in Britain.

Friendliness and that greatest compliment, candour, have been extended to me everywhere. For all of the kindness shown me I am deeply grateful. It has been a very happy and profitable visit for me.

And I have had the good fortune of an intensive review of the problems at an historic moment. I feel that many of the great issues of city building and, in fact, the whole character of British urban life, are hanging in the balance during these days of preparation for the transition and post-war periods. For Britain, as for the U.S.A., the comprehension and skill and energy with which we tackle the job of making true cities out of our sprawling industrial camps will determine the outcome for many years. Out of all the forces at play now the very nature of life in our cities is being moulded.

Some General Impressions

This is my third visit to Britain. As compared with 1921, I see three great changes in your cities. First, the damage done by enemy action is very apparent. Second, those big towns have reached out over the countryside. But that has been true of industrial and commercial cities all over the world. Third, and by all odds most important and most encouraging, the housing developments fostered by local council constitute a great wave of new life in the ageing physical urban structure. Of course, minor criticism can be made. But the whole result, the cumulative result of the two or two and a half million local-authority and private-enterprise houses built between the wars, under the sponsorship of local governments and assisted by governmental aid, created a dramatic and wonderful change for the better in the whole urban scene.

Proceeding from that experience, it seems to me that the policies and plans and programmes now taking form, nationally and locally, are heading in the right direction. I am thinking of the concepts of the nature or urban life and of the policies on land use and housing and community facilities which I can see emerging and crystallising. Many basic questions have become major public issues, but, in my mind, the general trend is essentially good. In this I believe I can see a great advance during the past twenty years.

My enthusiasm is tempered only by some evidences of delay. The formulation of really effective policies for city building and rebuilding seems to be slow both in the U.S. and Britain. I know very well that large-scale construction cannot begin now; and I understand the value of time in the democratic process. Thus the apparent delay is not surprising to me. But I have the impression that each fundamental question is decided only at the last moment, and that as a result, the programmes may go into action hastily and ill-prepared, each one partially negated by some still unresolved issues. I am not at all sure of my ground on this point. However, if there is some validity in my observation, and if this is the crucial period of preparation for you, as I believe it is for us, one may wonder whether the opportunity and the momentum and the effort may not be lost after all, at least in part.

Of course I have seen one of the really magnificent efforts of our time. Clearly, the manner in which the Government and the local authorities have set out, after the terrible early years of the war, and in the midst of pressing the war job on through, to make great plans for the future, has been a real inspiration to me. I think of Coventry, and I shall not forget the courage and energy and competence which that community is putting into its rebuilding programme. And that was true with all the others I visited.

For our cities, and for cities in other countries, I wish we had some reasoned method for determining the type of physical structure which would be the best all around in any given situation. I wish we had some method of computing and balancing the social-economic factors to guide policies—for example, on centralisation *versus* dispersion. You are certainly feeling your way toward such methods. Perhaps they have not yet crystallised either here or in the U.S.A. It may be that the Soviet Union is ahead of us here. This seems to me one of the many points where world-wide exchange of experience will help us all to resolve some of the most basic and obscure problems. I have the feeling that we are trying to cure where, in fact, we have largely to create anew. The social economics of housing—homes and communities—constitute a central consideration and major force.

I have been impressed by the importance of the rôle assigned to government, central and local, and by the major responsibility which government assumes in Britain. To a greater degree than at home, government seems to be considered the agent of the people, the agent to which both private enterprise and public enterprise look for the sponsorship and assistance needed to do what the community wants done. On this matter there seems to be relative harmony and a mood of tolerance and co-operation. Conversely, I may say that, to a stranger, the multiplicity and complexity of statutes and relationships are quite perplexing.

Housing Emergencies—U.S.A and U.K.

In the U.S. we have just passed through one housing crisis, and we are faced with the next one.

Four million war workers, involving perhaps 10,000,000 people, were drawn from their home localities to centres of war production. Shelter had to be provided for them. Half were accommodated in existing housing. About 2,000,000 dwellings of various types were built for the other half, all in great haste, during a period when war production itself had first call on all materials, manpower and transport. That was a monumental undertaking. To carry it out, the responsibility was placed in the central government, and the National Housing Agency was established. That agency gathers under one Administrator, John B. Blandford, Jr., all of the facilities of the Federal Government for planning, financing, building, and managing the utilis-

ation and provision of war-time housing throughout the entire country.

That war-time housing job developed methods of analysing housing requirements, of programming to meet the needs, and of canvassing and utilising all of the nation's resources, both of shelter reserves and for new construction. Among other devices, the techniques of prefabrication were expanded very greatly; and some 700,000 temporary accommodations were built by the government. There was no time to prepare properly for that housing emergency, and we had to improvise as well as possible under the difficult circumstances. Now we are over the hill on housing for war workers.

Our war-housing crisis was not unlike the most urgent phase of the present housing emergency here. It appears that the first few hundred thousand of new houses have to be secured by whatever are the quickest methods in the light of the shortage of manpower and of certain materials. Of course, that is the justification of temporary houses. Otherwise, temporaries mean trouble and waste, and the local authorities seem convinced of that. I have been told that the last of the temporary houses built to meet the emergency after the fire of 1666 were demolished only two years ago.

Now, there can be no doubt that the U.S. is in the mood to help in every possible way with the solution of the present problems in Britain. But there are several factors which are undoubtedly being weighed by those primarily responsible. We have a great shortage of homes in America. Materials and manpower and transport cannot be taken away from essential war production. Shipping space is needed, first of all, for war material and for relief supplies. Many other countries need houses or material for shelters. It takes time to assemble and ship houses over long distances. Such of our little war-time temporary houses as can be assembled and shipped might not please the people here. All told, I think we have to face the situation realistically, and I do not consider the prospects too good for this winter and spring. By early summer, we may well have our own production in better shape, and I have no doubt we shall then be able to help you.

Meanwhile, there may be opportunity to bring over the methods, and the men who know the methods, and even panels and parts of houses, or whole houses, as demonstrations—all for purposes of drawing on our experience for whatever it is worth in adaptation to British requirements. It is my impression that the shipping space devoted to bringing over a few men and a few demonstration pieces can be far better justified at this critical moment than trying to allocate shipping space for any large number of houses at, say, seven tons and 1,200 cubic feet each. However, I repeat, we want to help in every way we can.

Our transition and post-war housing emergency is similar to yours. Administrator Blandford has carefully canvassed the needs and has announced a goal of 12,000,000 new urban houses during the first ten years. This includes the replacement of about 6,000,000 substandard dwellings, with additional millions to be replaced during the second ten-year period. All told, this is a huge and very urgent task. The 12,000,000 is proportionate to the 4,000,000 quoted for Britain during the same period. I am sure we shall avoid temporaries. For reasons which are valid in our situation, we will depend heavily upon private enterprise right from the beginning. Prefabrication will be used more extensively than before the war for permanent houses. The main responsibility will return to the communities, with a carefully-designed set of Federal aids to help private and public enterprise to meet all segments of the housing need.

Housing Standards and Types in Britain

The high level of standards promulgated and generally accepted here for permanent post-war housing seems to me very good. As I understand it, every urban and every rural house built or modernised henceforth must provide a high standard of space, both inside and outside, and must provide inside hot water, flush toilet and bathing facilities. These standards are probably the highest in the world to-day. I have only enthusiasm for this achievement. I have seen these standards at work in places like Middlesbrough, child of some of the unfortunate traditions of the nineteenth century. I was informed that in Middlesbrough every dwelling is now provided with an individual, inside w.c. Their post-war planning is now well under way.

The general desire and the general policy favouring cottages with gardens, even though in "terraces," seems to me to reflect a world-wide tradition which is good and which is now reviving. The local authorities' programmes for community facilities are excellent. Our war-time testing of many theories of community centres may have developed experience useful to you here.

As for types of houses and the use of materials and methods of construction in Britain, I am puzzled. Apparently these matters are more deeply imbedded in tradition than is true with us. To me, they are too greatly hampered by tradition here. I have a strong prejudice in favour of more open and flexible and ingenious designs. It seems to me that the fine Georgian tradition can be adapted to modern modes in the use of its open planning, its big windows, its flat roofs.

To illustrate my feeling about the use of materials, I could not regret that the stone quarries in the Glasgow district are reported to be nearly worked out. Stone seems to me not a good material for small houses—expensive, cold, damp. We must keep closely in touch with each other on all the new materials which are being developed on both sides.

The convenient kitchen seems to be coming along very well—in fact, the convenient house. Of course, I am stopped by the *impasse* on central heating. Among the several very interesting things in Leeds, I was impressed by their work in central heating and other central services for flats, and by their work in combining the open fire with the elements of central heating for houses. The latter also impresses me in some of the current designs for temporary houses. I find myself hoping that these trends will develop through experimentation and demonstration. The drying closets that I saw in a number of housing estates seem to me an idea which we could adopt in some sections.

The architecture of small houses is very much a matter of personal preference. I thought it was best in and near Birmingham. In any event, new materials and new planning will, I hope, produce new and fresh architecture.

To summarise on this whole phase, there is a technical revolution taking place in housing almost everywhere. Why not in Britain?

Planning and Housing by Local Government

I was, most of all, impressed with the quality of planning and administration in local governments. The past hundred years of experience, plus leadership by the central government and by various individuals and associations, have produced a really excellent framework for planning and housing by the communities. The manner in which the responsibility is placed in the local councils and their committees and officers seems to me better than our prevailing system of ad hoc planning and housing agencies. In general the skill in housing seems to be ahead of the effectiveness of general-development planning, and this was considered to be a serious matter by local authorities which are not trying to rationalise their urban areas.

But the local planning is also coming along very well. Earlier work is not lost. In Bristol, for example, the present excellent planning derives in no small part from the start made twenty-five years ago. In the very first towns I visited outside London, Portsmouth and Plymouth, I got a sense of achievement which has steadily been maintained from town to town. And, of course, the plans for the City and County and Region of London, whatever adjustments have still to be made, are, in fact, world classics—a turning-point in the story of the big western cities.

For the re-development of central areas, the bomb damage offers an opportunity, and the new Town and Country Planning Act offers an instrument (perhaps not yet perfected) which puts you ahead of us. We are not as far along as you are in the re-design of shopping districts. And, for re-development programmes, you have a big advantage in that no compensation is ordinarily paid for substandard dwellings in clearance areas.

We have some new methods for analysing blighted districts; and we are working on measures to conserve neighbourhoods which cannot be cleared for a number of years.

As in the U.S.A., the local governments here face immediately the problems of making sense out of suburban development. I have been very much impressed by the deliberate planning for suburbanisation—for the "overspill" from the central cities. The accomplishments and the planning for municipal purchase of land have gone very much farther than I realised. For example, I understand that Liverpool now owns 9,000 of the 27,000 acres of its land area, plus 8,000 acres outside the corporation boundary. The zoning and building controls seem to be working well in general from the point of view of both the public interest and private enterprise. Our zoning without compensation has some advantage for urban situations as we find them.

The preservation of open greenbelts, and the development of planned satellites and suburbs are generally encouraging to an American. It was very good again to see Bourneville, Letchworth, Welwyn, and Wythenshawe, and their people, all doing extremely well.

I believe we have learned something about site planning for convenience and privacy and economy. We do better than you do with street trees and roadway planting.

In the management of local authority housing we have adopted generally the principle of adjusting rent to income, and I think it might be more widely considered here.

We have begun to use some new methods of analysing the need for housing, by numbers of houses, by geographic areas and by income groups. The latter reveals the need for special measures to provide for certain middle-income families—your group at, say £400 to £800 per year, key people in many industries. In Manchester, where I found much that interested me, an apparently very useful method has been devised to forecast the probable proportion of family compositions, and hence to design neighbourhoods for approximate numbers of single persons, families of various sizes, old people, etc.

We always proceed to estimate dollar costs and to proceed to the plan for financing. I felt that many of the planning and housing programmes here would benefit by similar estimating in all its aspects.

May I hazard some general observations on the position of your local authorities? They have had enough experience with the various tools over a long-enough period to be ready now for guiding the suburban development well, provided only that some remaining obstacles are removed. For the rebuilding of central areas there is much less experience, and the difficulties are greater. This latter is certainly true with us in America.

The local authorities here, as in the U.S.A., seem to be a little ahead of the central government in clearly defining certain of the problems, in testing methods of treating them and in visualising the basic measures which will have to be adopted to accomplish what they see as necessary. There are good explanations for this situation, similar on both sides—the war, the inevitable uncertainty of the time sequence, the national economic problems. However that may be, from my brief observation my hat goes off to the courage and intelligence with which your local authorities are planning their future development.

In talking with each local authority, I asked them what they find to be the principal obstacles, and also what they think the chances are of carrying out their plans and programmes. This is rather deep water for a "sixty-day wonder," but I would summarise the obstacles to be: apathy where keen interest is needed; the almost inevitable conflict between the public interest and the interest of private property; the formulation of financial aids from the central government; and the clarification or reorganisation of local governmental areas of jurisdiction. All of these, including the last-named, seem to call for national policy and national action. Then, I estimate that at this time of historic opportunity, the outcome hangs in the balance. I might bet even money but I wouldn't give any odds that the local communities will be able to do substantially what they find essential for their development and re-development and to do it in time.

I would like to make special mention of Bilston, a smaller urban community in the Black Country near Birmingham. In a real sense, the Industrial Revolution started in Bilston something more than a hundred years ago. (Who knows the end of what started in Bilston?) It is a town of smoke, dump heaps, derelict areas, slums, a changing industrial pattern, and it is a town with very carefully studied but very bold plans for its resurrection and rebuilding.

Let me speak for one moment of my quick impressions of South Wales. Cardiff and Swansea have the finest civic pride, the most intense civic pride. Cardiff has the best civic centre I saw. Swansea is making the best plans to take advantage of its beautiful setting along a great arc of beach. The coal towns of South Wales? Not worse than some coal towns in the U.S.A.; and, like them, they have to be substantially started over again, it seems to me.

Four days in Scotland are only an introduction. Edinburgh seemed to me the most distinguished city I visited in Britain. But in Edinburgh and Glasgow, a large proportion of the population live in caves—families of five and more in one-room stone caves without private sanitary facilities. That, it seems to me now, is the worst housing I was shown in Britain. In 1866 Edinburgh started what may be the first slum-rebuilding programme in the western world, clearing areas where families were living at 200 to the acre in five-story stone tenements. Scotland has a great housing programme in formulation—number of existing houses, 1,200,000; number to be built to replace substandard housing, 500,000. Clydebank housing was badly blitzed. Clydebank is not afraid of new ideas in rebuilding. Westquarter looked like one of the best housing estates in Britain. Glasgow has a housing department, a guaranteed weekly wage for its construction workers, a municipal factory for making wall panels, and a big re-development planning operation, city and regional. They're hardy, the Scots. They need to plan, and they have started.

The British National Programme

The national housing policy of Great Britain can be seen emerging in Parliamentary debates and acts, in various public statements, in the work of the advisory committees and royal commissions and research groups, and in the several very excellent reports which have appeared during the last couple of years. It seems to me to represent a great advance over pre-war. And it seems to me more progressive and more realistic than the policies which have thus far actually been formulated on a national scale in the U.S.A.

I believe we have gone further in defining the rôle of housing in our national economy—the proportion of national income and of investment and of manpower which it is both feasible and desirable to devote to the building of houses and communities. It may be that we have made a more complete canvass of our resources in materials and production. We had to do this for war housing. Our Administrator and Congressional committees are carefully appraising the need for housing in all its categories—the housing supply, the home-building industry, the problems of finance for housing, the technique of design and construction, the difficult land problems, the incidence of taxation upon the cost and quality of housing, measures for urban redevelopment, and so on. A total integrated national housing policy will be drawn from these studies.

Certainly Britain needs to canvass and utilise all of its resources. For example, local financial resources cannot be over-estimated. I was interested to find that even the big local authority housing programmes here require for the local subsidy only 3 per cent. to 10 per cent. or so of the total local tax revenues. In the search for additional sources of local revenues, I have cited the Philadelphia wage tax, which is a small local levy on all income earned in the city, whether the earner lives in the city or in the suburbs. Other American cities are considering similar arrangements.

Of course, we find our 1940 census invaluable to us. We hope

to have a partial census during 1945, and it will clarify many problems of housing resources, housing conditions, and housing needs.

Housing is a World Problem

Social organisation, government and business are all tested by relative success or failure in providing good neighbourhoods and good homes. Your society and ours, and that of the Soviet Union, will be under closest scrutiny to see which of us can make humane and economic communities out of our industrial cities.

Beyond that, a glance at the rest of the world will reveal that there is a housing emergency, even a housing crisis, in all of Europe, in Asia, in Latin America. War destruction dramatically accentuates the emergency. But, in fact, while the war may have destroyed some millions of homes, the pre-war and post-war need for decent houses, all told, runs into the tens of millions. Just as the U.S.A. needs 12,000,000 new houses in the next decade, and Britain perhaps 4,000,000, other countries with a huge total population need new houses at the rate of, say, one house per hundred population per year, roughly the rate proposed for our two countries. And such figures run into the tens of millions of houses in a world housing programme.

This is not only a measure of a world need for houses. It is also a measure of an opportunity for employment and for the creation of wealth.

Now, each country and, in fact, each region, tends to use its own materials and its own standards, for housing. That seems to me appropriate. But there can certainly be a pooling of knowledge and an interchange of experience. That is what I want to see happen, in a constant and systematic manner. I want to see a world exchange of methods, ideas, professional people, students, builders, workers, publications—all for purposes of keeping abreast of one another in the revolution which is sweeping our home building and our city building everywhere.

I am sure President Roosevelt had this in mind when, in 1942, in the very midst of war, he said in a published letter that as we achieve victory we shall join with the other free people of the world in undertaking to provide a good home in a good neighbourhood for every family the world over.

ABSTRACT OF THE DISCUSSION

The Rt. Hon. Florence Horsbrugh, M.P. (Parliamentary Secretary, Ministry of Health) recalled that at the outset Mr. Crane had said that he might be accused of being a "sixty-day wonder" in the bad sense of that term; she thought that in view of the way in which he had absorbed knowledge of British housing work he was certainly a "wonder," whether he did it in sixty days or in any other period.

Housing problems, Miss Horsbrugh said, were not only our problems here in Britain but problems which had to be faced in the United States, in Soviet Russia and throughout Europe. The suggestions for the pooling of knowledge and the exchange of experience which Mr. Crane made would be received with the greatest gratitude by this meeting and by the people of this country. She was interested to hear that Mr. Crane thought that the local authorities were going to use their powers efficiently, and that in fact they were rather ahead of the Central Government. In developing housing, opinions had to be sought from a large number of people. There was nothing in which the individual, as an individual, was so interested as his house, his *home*.

The people of this country had a certain traditional outlook, as Mr. Crane recognised, and it was no use the Central Government, or even the local authorities, putting forward proposals and saying that they had to be adopted. Changes could only be made by demonstration and by persuasion, and it would help us enormously to hear what was being done in other countries. If it was possible for people to come here from the United States and perhaps show us demonstration houses, it would be of immense value.

We here had been apt to think that the United States had gone very far ahead with prefabrication, even before the war, but it was realised, from what Mr. Crane had said, that after all there was a great deal more study required.

Mr. Crane had found that tradition here was very strong. He had spoken of Scotland and of the use of stone as a building material. There was a very strong tradition on this matter in Scotland. Miss Horsbrugh assured Mr. Crane that in many cases in her constituency of Dundee, when people were moved from stone to brick houses they said "How can people possibly live in these brick houses? They are so cold! Take us back to our nice, warm stone!"

Mr. H. G. Strauss, M.P. (Parliamentary Secretary Ministry of Town and Country Planning), who seconded the vote of thanks, said that there was nothing new in getting good advice from distinguished citizens of the United States after sixty days, or even less. He remembered a problem being solved by one of Mr. Crane's fellow-countrymen much more quickly. He had had the pleasure of paying his first visit to the United States in 1928, and on his way back he had made friends with an American, paying his first visit to England. They speculated on what would strike him most, and arranged that the American should dine at his home at the end of his second day. They arrived in this country at a time when there was a great deal of unemployment among the coal miners. The American burst into Mr. Strauss's house at the end of his second day in London saying, "I have solved your coal problem!" "Heat your houses!" Guests from America were particularly welcome when they were technicians and came here to share their problems with their opposite numbers in this country. That interchange of knowledge by technicians was useful in the sphere in which they were technicians. Miss Horsbrugh had pointed out the striking fact that although we had suffered appalling war damage and America had not, yet they had a problem comparable to our own.

Mr. Strauss thought that the best way of fostering Anglo-American friendship was not deliberately to seek to do anything of the sort, but rather to take such friendship as a natural background to our thought, and to talk openly and critically on our own subjects with each other. That purpose was admirably served by Mr. Crane's visit.

Mr. Crane had the smallest appetite for talk and the greatest appetite for work of anybody Mr. Strauss had ever met. He had started off by arriving twenty-four hours ahead of his due time. Within an hour of his arrival he was in the House of Lords, following the progress of the Town and Country Planning Bill with critical intelligence.

Mr. Strauss expressed his pleasure at the fact that Mr. Crane was primarily and before all else a town planner. As he had revealed in his address, and also in the questions which he had put both to the central and to the local authorities, he had approached the problem of the provision of housing from the point of view of good planning. He realised quite definitely that if progress was to be made with the urgent problem of putting up sufficient houses it was necessary to know not only how many houses were required and what accommodation they had to provide, but also what was the right place to put them in.

He understood that in the United States it was a necessary condition for obtaining a subsidy for housing that there must be a good plan for the houses which it was proposed to erect.

He hoped that the effect of Mr. Crane's address and of his general attitude would be to drive away the thought, if anybody had it, that planning objections were something which ought to be swept aside in order to get on with building. Town planning was an economy and not an extravagance; it was something which had to precede success, and not something which sought afterwards to catch up with failure.

Finally Mr. Strauss commented on one sentence in which Mr. Crane had said that he had been very much impressed by "the deliberate planning for suburbanisation" for the 'overspill' from the central cities. "Suburbanisation" was used there, Mr. Strauss said, in a good sense, but he thought that it would be generally understood in this country, isolated from its context, as meaning something rather different. It was true that in our last statute we had provided for the acquisition by local authorities of areas for the re-location of population and industries. (That, he said, sounded fairly horrible, but he thought that the expression "overspill" was even more disgusting, and it did not occur in the statute.) They proposed to avoid re-creating or replacing without curing existing congestion, and for that reason areas had to be acquired outside the existing area; but it was proposed that the new places acquired for the re-location of industry and population should form proper communities, either new communities, or

where expansion was appropriate, additions to existing communities. He had no doubt that that was what Mr. Crane meant, and was what his words would convey to an American audience; but he thought that the present audience would agree that they would be liable to misunderstanding if published in this country. It was for that reason that he had ventured to comment on them.

Mr. Strauss said that he must not touch on the many other subjects raised in this interesting paper; his purpose was to second the motion that a very hearty vote of thanks be given to Mr. Crane. In concluding, Mr. Strauss especially thanked Mr. Crane for his introduction of Major Reed.*

Mr. C. Silkin, M.P. (London County Council) said that it was appropriate that somebody from a local authority should make a few observations. He found it extraordinary that Mr. Crane should have been able to diagnose the housing situation so acutely in the short time that he had had. Perhaps he had been a little too kind. Mr. Silkin did not altogether agree when he talked about the high standards of our housing in the years before the war. Our standards were not high enough, but Mr. Silkin hoped that we should put that right after the war. He recollected some of the big mistakes which were made, and which perhaps were inevitable, in that period. In those years, when they had been cursed with the need for clearing the slums and dealing with overcrowding, in the large towns where sites had been difficult to obtain, they had built on any sites that had become available. If a site had happened to be near a railway siding or a gasworks it was cheaper, and they jumped at it—with the connivance of the Ministry of Health—and built on it. Some of the terrible examples to be found all over the country were due to that fact. He hoped that in the post-war years they should regard the provision of housing as part of our planning, and not go back to the days when they merely took a site and built on it.

Another difficulty which they might still have to face after the war was due to the fact that local authorities were compelled to build houses for the working-classes alone. They had no power to build houses for any other class. Becontree contained 25,000 working-class houses and almost no others. To contemplate 120,000 people all of almost one income level herded together on one estate filled him with horror; but the local authority had had no option, because they had had no power, and they still had no power, to build houses for classes other than the working-class. The Town and Country Planning Act might possibly give that power, and he hoped that the Government would be wise enough to see that local authorities had the power to provide for mixed development and for proper communities; otherwise all our housing activities would have been in vain.

Mr. Silkin referred to the difficulty of acquiring land, and the high cost of land in an urban area. £15,000 to £20,000 an acre had to be paid for land for working-class housing in London, and something approaching that figure in some of the other large towns. He hoped that something would be done about the land question. It was a problem which was going to make for very great difficulty unless it was solved.

Finally he suggested that we were very much behind America in actual technical building methods, and he asked Mr. Crane to say a few words on that subject and not spare our feelings.

Mr. G. C. Winbourne [*F.*] hoped that the policy should not be allowed to continue after the war by which the greater part of our housing was done without architects, was speculative financially and shoddy in construction and landed the occupier in endless difficulties. He felt that the legislation which was taking shape to-day would ensure that a first-class standard of building is observed.

He also referred to the ill effects on building design of the powers of the Ministry of Health to alter schemes and to the crippling effects on amenity and site planning of the demand to build at the lowest possible cost.

Mr. G. A. Jellicoe [*F.*], said that he was interested in the contrast drawn in Mr. Crane's address between broad planning and hasty decisions. He drew attention to the fact that all the great reports, plans and researches now coming to fruition had been initiated by the Minister of Works of three years ago. He felt that one of the obstacles to good house design now was, in fact, the present Ministry; recent decisions had been hasty and apparently thoughtless. He considered that the Ministry should be regarded as the contractors among the parties concerned in the production of houses. Contractors did not normally produce good architecture, for they were primarily men of action. He amplified this by referring particularly to the way in which changes in the final design of the Portal house were made, and deduced that the housewives were taken literally and the architects were not.

Mr. F. J. Osborn underlined several things Mr. Crane had said. He had referred to the very special opportunity that Britain had in the matter of housing and town planning together, and to the fifty-fifty chance that we would seize that opportunity. He thought that Mr. Crane was absolutely right. Politically England was going Left Centre. But it was touch and go whether we went Right or Wrong in the whole question of urban development after the war, whether we made the same mistakes as after the last war or went in the right direction.

There were encouraging signs, as in the Abercrombie Greater London Regional Report, but housing ran away with planning after the last war, and there was quite a possibility that it might do so again and at an even greater rate. We were all agreed that in round figures we should have to build about four million houses in the first ten or twelve years after this war. It was quite probable that in the next twenty years we should build something like eight million houses.

But a fact to which insufficient attention had been paid and which Mr. Osborn was very glad to hear Mr. Crane mention, was that to a much greater extent than after the last war the enlarged housing scheme would be for *replacement* housing. After the first burst of catching up arrears, when we were building the last six million houses we should be replacing existing houses. That raised the question of what we were going to do with the sub-standard existing house which had still a rental value. He wished to draw Mr. Crane's attention to the fact that that was being discussed a little in this country, but not nearly as much as was desirable.

He had seldom listened to a talk which gave the feeling that we were getting the honest truth from the speaker.

Capt. R. L. Reiss, who had actually worked with Mr. Crane in a Government department in Washington, mentioned that in Mr. Crane's room in Washington he had framed the plan which is to be found at the end of the last book issued by the L.C.C., which showed the number of places where there were housing estates in London. Mr. Crane was using the fact of the large number of housing schemes carried out by the L.C.C. definitely as an object lesson to everyone who came into his office to discuss housing.

Capt. Reiss pointed out the importance of our distinguishing in prefabrication between prefabrication of internal fittings and prefabrication of walls and roofs. British architects and technicians could learn an immense amount from America in connection with the prefabrication of internal fittings.

Most architects designing small houses between the wars in Britain designed their houses, including the kitchen, and then tried to design the kitchen cabinets and shelving and various other things which went into the kitchen to fit into the kitchen which they had provided. In the United States the process had been reversed; the American architect prepared his plan bearing in mind that his kitchen had to be designed to take prefabricated equipment.

Mr. Jacob Crane (in reply) said that there was one question noted down which seemed to call for some response, the question of building methods, which Mr. Silkin had raised. He wished to refer it to Major Reed, who was a much more experienced expert in their building methods than he was. His time here had been very happy; it had been a very profitable visit and he thanked everyone very much indeed!

* *In the course of his paper Mr. Crane introduced Major G. L. Reed, a housing technician, who had been responsible for the construction of between 30,000 and 50,000 "hurry-up" war-time houses in the Newport News area of Virginia and was now attached to the United States Ambassador's office, to convey British housing experience to the U.S.A. and to be available to British architects to enable them to tap the experience of the U.S.A.*

ZINE. DAILY MAIL. WEDNESDAY. DECEMBER 11. 1907.

Nine-Roomed Houses for £200.

Mr. Edison's Plan for Cheap Dwellings.—Has He Hit Upon a Practical Scheme?

IN these days everyone is anxious to live rent free. As soon as the newly married couple have been able to save a little money they look round for a house suitable to their means which they can buy either for cash down or on the instalment system.

But hitherto the great drawback to house-buying has been the cost of the house. Certain classes find they have to pay from five to eight hundred pounds for a dwelling-place, and in many cases they decide it is beyond their means, and go on paying rent. Now Mr. Thomas Edison, the wizard of America, announces that he has disposed of this difficulty by inventing a method whereby an eight or nine-roomed house can be built for £200.

Mr. Edison's method is one of marvellous simplicity. There are neither bricks nor beams nor slates used in his model house, and it can be erected with less than a tenth part of the labour expended in building a house in the ordinary way.

Mr. Edison's scheme calls for the use of concrete—a mixture of cement, sand, and crushed stone. The inventor is making a set of nickel-plated iron moulds, the shape of the house. These will be set up and fastened with trusses. Then the concrete is to be pumped into these moulds by compressed air from two cylinders. The flow of concrete into the moulds must be rapid and continuous, otherwise a line would appear wherever it stopped, and to secure this a Ransome "mixer" would be needed.

After being left for six days, during which time the concrete sets hard, the iron moulds are taken away, and the house stands there complete, with nothing lacking save the wooden frames for doors, windows, etc. In another six days, says Mr. Edison, the house will be dry and fit for habitation.

Not only will the walls, floors, fireplaces, chimneys, and roofs be thus made from concrete, but baths and similar fixtures will be cast in place, and pipes for heating and carrying electric wires will be placed in position before the concrete is pumped into the moulds, and then surrounded by the material of which the house is built.

Mr. Edison says any design can be followed—it is only a question of making the moulds of different shapes.

But he is having the first made in the style of Francis I., richly decorated with designs that would be prohibitive because of their cost if they were made in stone.

The walls will be twelve, ten, and six inches thick in various parts. The interior will be hand-somely ornamented, making no further decoration were necessary after the moulds are removed. The roofs will imitate tiling, and can be coloured to suit the owner's taste, and the interior can also be coloured to add to the effect.

And all this can be done, Mr. Edison claims, for about £200. The iron moulds are, of course expensive, costing about £5,000 the set, and the machinery necessary will cost another £3,000; but once made they will be available for an unlimited number of houses.

In a letter published in the "Times" Mr. Edison says he desires to make no profit from this invention, and he will be pleased to license any reputable persons to use his methods provided they submit the house designs for his approval and guarantee to use good materials.

He adds that the scheme is only workable on sandy soils, where the material dug out for the space occupied by the cellars of the houses can be used in making the concrete of which they will be built.

At first sight it would appear that the great American inventor had hit upon a plan which will revolutionise house-building. But English architects have for some time past been experimenting with concrete to find how far it can be used in house building, and they are somewhat sceptical as to the success of Mr. Edison's invention.

A firm of architects in London recently designed a six-roomed cottage which was erected at the garden city of Letchworth. In a sense the cottage was a success, but apparently its cost was against this material being very widely used.

"The point is," said Mr. Hesketh, the architect, to the writer recently, "that such a building can only be put up economically where the soil is sandy enough to give you your ballast to make the concrete. If you have to cart the sand from a distance the cost of the building is enormously increased.

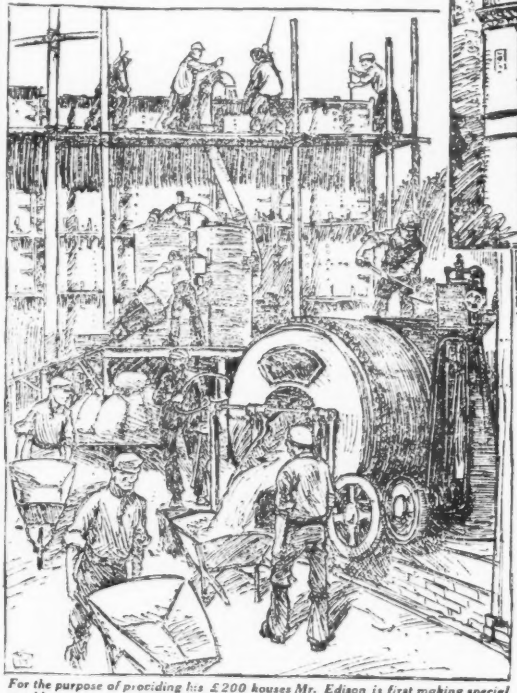
"This limits the demand for such buildings, and unless there is a very large demand it would not pay anyone to go into that line of business.

"Another objection to Mr. Edison's scheme is that if the walls are of solid concrete the building would be damp. To avoid this we made our cottage walls double. We cast the slabs two inches thick with a plate of perforated iron in each to strengthen it. Then the slabs were put in position with a space of two inches between them, which prevented the damp working through.

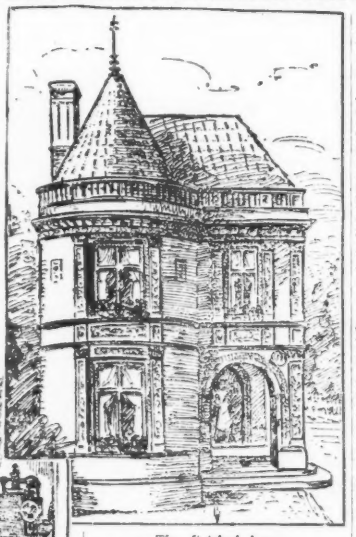
"I may say that our plan was to cast the whole cottage in pieces and to send these pieces by rail to the spot where they were wanted, but we found that, as the cottage weighed some sixty tons, the cost of carriage would make the price of the building prohibitive.

"From the results of our own experiment I doubt if a satisfactory house could be built in this country, at any rate, for £200; but the result of Mr. Edison's scheme will be watched with great interest."

T. B.



For the purpose of providing his £200 houses Mr. Edison is first making special moulds at a cost of £5,000, and into these moulds, at any spot selected, concrete will be pumped by compressed air. After standing six days the mould is removed, and the finished house laid bare.



The finished house.

"A SINNER IN ISRAEL," a Drama of modern Jewish Life, begins in TO-MORROW'S "Daily Mail."

To-morrow "A SINNER IN ISRAEL," by Pierre Costello, begins on this page. It is a novel dealing with modern Jewish Life.

How the Fat May Become Thin.

An Easy Scientific Method.

THOUGH a very large proportion of mankind remains thin and bony through

used by Dr. Mauge have the effect, when carried out by children, of rapidly enlarging the thorax, and consequently the

Fig. 1. Draw in as much breath as possible during this part of the exercise. Then lower the arms slowly until they

rally to the sides. Breathe in during the rising motion, and expel as the arms fall to the sides.

The above exercises will at once develop the inspiratory muscles and the fixative muscles from the shoulder-blades to the

RAPID HOUSE-BUILDING IN 1907

We have received this amusing cutting from the Editor of the *Daily Mail*, in the pages of which it was published thirty-eight years ago. Mass-produced all-concrete houses ready in six days—any design can be followed, it's only a question of making the moulds of different shape, but Mr. Edison is having the first made in the style of Francis I. . . . But "English architects are somewhat sceptical." It will be interesting to know if any of those Edison houses were built in America and if the six-room concrete house at Letchworth remains.

THERMAL INSULATION IN BUILDINGS

By A. F. DUFTON, M.A., D.I.C., Hon.M.I.H.V.E.
of the Building Research Station of the D.S.I.R.

"I am well aware that it is by no means enough for those who propose improvements to the public to be in the right in regard to the intrinsic merit of their plans: much must be done to prepare the way for, and to facilitate their introduction, or all their labour will be in vain."—Rumford.

This paper, which deals with the need for a better appreciation of the benefits which accrue from the proper use of insulation, was written as a contribution to a discussion on "The Properties and Testing of Heat Insulating Materials." Although it has had to await publication—it was contributed to the Journal in 1939—it is still topical: the importance of thermal insulation is even greater now than in the days before the war.

There appears to be a widespread impression that insulation is a luxury, that in the climatic conditions prevailing in this country problems of thermal insulation arise only in connection with the heating of buildings in winter, and that the only point to be considered is the reduction of heating costs and the return to be obtained upon money invested. If the financial return is meagre, insulation is generally regarded as not worth while; and in many instances thermal insulation is not even considered on account of the importance which is attached to every reduction in prime costs, irrespective of running cost, maintenance or amenity.

There would seem to be a real need for a better appreciation of the benefits which accrue from the proper use of insulation. This opened up a very wide field and perhaps it will suffice in this present discussion if the point is made that whenever insulation is provided additional advantages are gained which are not usually taken into account when the economic value of insulation is assessed.

A few examples will perhaps make this clear. In a block of offices, there will be a certain reduction in heating costs if the roof is suitably insulated, a reduction which may be only a small percentage of the total, and this saving is the basis upon which such insulation is usually considered. Far more important than any reduction of costs, however, is the consideration of the warmth in the topmost offices upon a Monday after the heating has been reduced at the week-end. Without insulation, although the heating installation may be adequate to *maintain* the upper floor equally as warm as the remainder of the building, it may be found to be quite inadequate to raise the temperature of the rooms in reasonable time when they have been allowed to become cold.

Again, when the insulation of the hot-water system in a building is under review, the reduction in fuel consumption is not the only item which is relevant. If the stored hot water is insulated it may be economic to store a larger volume. There is no need to heat water in a hurry and considerable advantage may be derived from spreading the duty of the boiler over twenty-four hours. A smaller boiler may be able to do the work not only with a reduction in prime cost but also with less labour and with greater efficiency because of the more constant load.(1)

Insulation to prevent heat-losses is not entirely a matter of balancing costs, and in winter a well-insulated room can be much more comfortable than a room which has cold walls and is heated to the same degree by a roaring fire. In this connection the use of double windows would appear to merit much more consideration than it now received. Double glazing is rare in this country, but it is interesting to recall that at the end of the eighteenth century Count Rumford installed it throughout his famous house in Brompton Row. With suitable insulation, moreover, the smaller heat requirement may make it practicable to use gas or electricity for heating and attention may be invited to the desirability of providing, in a room which is to be warmed intermittently, insulation of low thermal capacity, such as wood or a suitable wall-board.(2)

Many rooms are difficult to warm and the author had practical experience of this some years ago in his breakfast room. The room was provided with a gas fire burning 0.2 therms per hour, and in the winter it was impossible to get the room warm for breakfast. Records of the warming of the room were made with a eupatheoscope eight feet from the fire, both with the instrument exposed directly to the radiant heat and also when screened from the fire. After these records were obtained the room was lined with oak panelling and further records were taken.(3) Without taking the furniture into account, only one-half of the boundary surface of the room was changed by the panelling—the ceiling, window, floor and door were not affected—yet the change in the room was remarkable. The room was warmer after half an hour than it used to be after an hour-and-a-quarter's heating. Figure 1 shows the records obtained and is arranged to show the warming for one half-hour of occupation. From the practical point of view the important fact is not that one hour's heating suffices instead of two, but

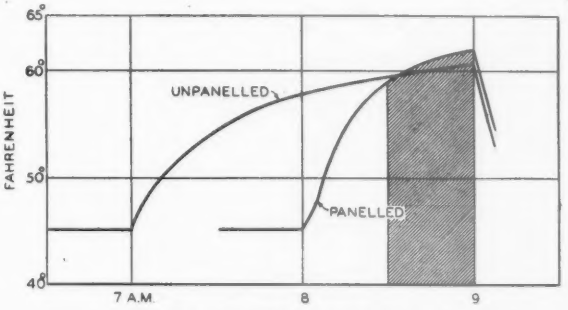


FIG. 1. *The effect of panelling on the warming of a room.*

that a fire may reasonably be lit half an hour before the room is wanted. The room was formerly uncomfortable unless the fire was lit an hour and a half before breakfast.

It is not always realised that the problem of keeping a building cool in summer may, even in this country, be as important as that of warming the building in winter. Not only are questions of comfort involved and of economies to be effected by reducing the load in air-conditioned premises, but consideration must also be given to the possibility of structural damage occurring owing to the expansion caused by high temperatures.

Various thin structures have been tested at the Building Research Station with a view to obtaining data as to their relative efficacy in excluding solar heat. The first experiments were made in connection with the reduction of the heat transmitted by roof-glazing.(4) Four large boxes measuring 3 ft. 7 in. square by 1 ft. deep were filled to within 4 in. of the top with slag-wool insulation, on which were laid blackened copper sheets fitted with thermocouples for the recording of temperatures.

The tops of the boxes were closed with sheets of ¼-in. rolled plate glass, measuring 3 ft. square. Conditions were thus somewhat similar to those within a building, the glass sheets representing roof-lights and the blackened copper sheets objects warmed by sunshine passing through the glass.

Continuous records of the temperatures within the boxes were obtained on a number of sunny days, with various modifications of the glass sheets, and in order to associate the measurements made on different days, the amount by which the maximum temperature in a box exceeded the maximum air-temperature for the day was expressed as a percentage of the corresponding figure for clear glass. The resulting values are shown in Table I.

TABLE I
THE EFFICACIES OF VARIOUS THIN STRUCTURES IN EXCLUDING SOLAR HEAT

Structure	Surfaces Upper/lower	Relative Temperature Excess
Glass	Clear/clear	100
„	Clear/whitewash (1 coat)	61
„ white calico 1 in. below	Clear/clear	57
„	Green Distemper (1 coat) clear	55
„	Whitewash (1 coat)/clear	49
„	Clear/whitewash (2 coats)	46
„ white calico 1 in. above	Clear/clear	40
„	Whitewash (2 coats)/clear	28
Metal sheet	Black paint/black paint	42
„ „	Black paint/aluminium paint	36
2 metal sheets with 1-in. unventilated air-space	Black paint/black paint)	33
	Black paint/black paint	
Galvanised iron, corrugations N.-S.	Untreated	29
Asbestos-cement—flat sheet	Untreated	24
2 metal sheets with 1-in. ventilated air-space	Black paint/black paint	23
	Black paint/black paint	
Wallboard (½ in.) between metal sheets	Black paint/tinplate	19
Metal sheet	Tinplate/white paint	17
Wallboard (1 in.) between metal sheets	Black paint/tinplate	14
Metal sheet	White paint/aluminium paint	8
„ „	Tinplate/tinplate	6
„ „	White paint/tinplate	0
2 metal sheets with 1-in. unventilated air-space	White paint/Tinplate	1
	Tinplate/tinplate	
2 metal sheets with 1-in. ventilated air-space	White paint/tinplate	3
	Tinplate/tinplate	

Of the treatments tested the most effective proved to be two coats of whitewash on the outer surface of the glass, differences of temperature of more than 80 deg. F. being observed beneath the glass treated in this way and beneath clear glass.

On the opaque portions of a roof there is rather more choice in treatments for excluding solar heat. The most effective single treatment is to whiten the outer surface of the roof and so to prevent the absorption of heat, but other possibilities are to incorporate some form of insulating material in the roof and to take advantage of the low emissivity of polished metal surfaces. A number of measurements showing the relative effects of these various modifications have been made in the insulated boxes and the results, expressed on the same basis as those for the glass specimens, are included in Table I.

The efficacy of a material in excluding solar heat is a complex function. The suggestion [5] has been made, however, that athermanous materials may be graded in terms of the empirical transmission factor,

$$F=(1-R)/\{1+(1+E_2)\,[1/(1+E_1)+1/K]\},$$

where K is the conductivity (B.Th.U. per sq. ft. per degree Fahr. per hour), E_1 the emissivity of the inner surface, E_2 the emissivity of the exposed surface and R its reflecting power for solar radiation. Both surfaces are presumed to be in contact with air.

It will be realised that the heating effect of solar radiation upon a building is influenced very greatly by the reflecting characteristics of the external surfaces of the walls and the roof, and this factor has been investigated very fully at the Building Research Station.[6] Equipment is available for measuring in the laboratory diffuse-reflection coefficients for solar radiation and such coefficients have been determined for a large number of building materials.

For the laboratory measurements it is desirable to have a source of radiation very similar to that of summer sunshine; for this purpose a pointolite lamp is used in conjunction with a carefully prepared filter made of thin gold.

Returning to the question of the insulation of a building against the loss of heat in winter and the appraisal of different forms of insulation, it is, of course, well known that the thermal conductivity of a material, as measured in the laboratory, is not the only factor which must be considered.

Heating engineers compute the contribution of a wall to the loss of heat from a room as $UA\,(T^1-T^2)$, in terms of the area A and air temperatures T^1 on one side and T^2 the other. For this computation values of U, the transmittance of the wall, are necessary. The coefficient U is empirical and the value required depends upon the situation, upon the room to which the wall belongs and also upon the exposure of the wall. This is well brought out in a very useful little booklet "The Computation of Heat Requirements for Buildings," published by the Institution of Heating and Ventilating Engineers.[12]

It may be of interest to mention that if the heat losses are calculated for two similar rooms, one of which has two walls exposed—that is, two cold walls—and the other only one, and the same air-to-air coefficients are used, the heat loss from the first room will be relatively over-estimated, because the radiation exchange between the two exposed walls does not contribute to the loss of heat from the room. In practice this over-estimation of the heat loss is not a serious matter because it leads to a higher air temperature being obtained, and a higher air temperature is advantageous because it compensates for the cooling effect of the second cold wall.

It is not proposed to extend this paper to include the work which has been carried out at the Building Research Station upon the heat losses through roofs or the researches carried out in a special laboratory for the determination of the heat-transmission of walls. These investigations form the subject of a separate Technical Paper.

Methods of recording the flow of heat through a wall or a window have been developed at the Building Research Station, [7], [8], and various measurements have been made which indicate the importance of correlating laboratory measurements with full-scale determinations.[9], [10]

For some time the need has been felt of simple apparatus for measuring the flow of heat at an extended surface, such as that of a wall. Suitable meter-plates have now been developed for this purpose, [11] each comprising a plate 2 in. by 1 in. of synthetic resin material ⅛ in. thick provided with an embedded system of 50 silver-constantan thermocouples. Such a plate is readily attached to a wall by means of two layers of insulating tape, used with the less-sticky sides together, and it is convenient to combine the plates in groups of twelve distributed over the surface at which the measurement is made. The mean sensitivity for a single plate is 66 micro-volts per B.Th.U. per sq. ft. per hour.

This review would be incomplete without some reference to

the use of insulation for the prevention of condensation, and this application may be illustrated by reference to a simple investigation carried out in connection with unglazed pictures.[13] At one picture gallery the experiment has been recently made of removing the glazing from certain pictures and on at least one of these the occasional presence of condensed moisture on the picture surface has at times been shown unmistakably by microscopic examination. The advice of the Building Research Station was sought as to what conditions were likely to promote such condensation and what treatment could be applied to an unglazed picture to reduce the risk.

From an inspection of pictures in the gallery it seemed probable that the trouble arose on those occasions following a change from cold to milder weather, when the air in the gallery was humid and the external walls were comparatively cold. In these circumstances the canvas of an unbacked picture loses heat by radiation to the cold wall behind and may be cooled sufficiently for moisture to be deposited on its front surface.

Experiments were made in the laboratory with a wooden frame of 2-in. by 1½-in. section constructed to form two adjacent panels 2 ft. square. Canvas was stretched tightly over the frame and given five coats of paint with a light brown finish. The differences of temperature between the picture surface and the adjacent air were measured at the centres of the two panels by

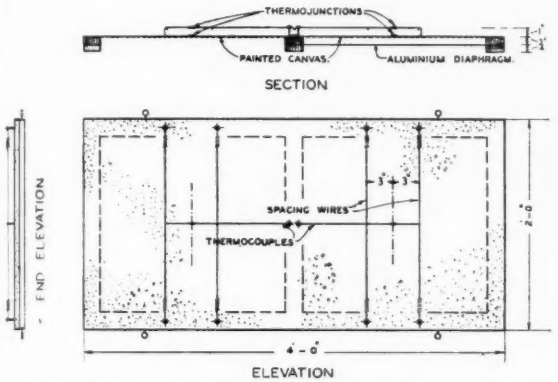


FIG. 2. *Experimental "picture" showing aluminium diaphragm and differential thermocouples.*

means of thermocouples and behind one panel a diaphragm of aluminium-faced asbestos-paper was fixed at a distance of ¾ in. from the canvas to form a closed air cavity.

This picture (Fig. 2) was hung in a corridor on an external 9-in. brick wall of southerly aspect and it was arranged to hang either way up so that any effect due to the differences of position of the two panels could be investigated. From observations made upon a number of days it was shown that by radiation to an external wall the unbacked canvas of a picture may be cooled several degrees below the temperature of the air in a room; that the difference of temperature between the air and the picture surface is not greatly affected by fixing the picture clear of the wall surface so as to ventilate the back of the canvas; and that by providing a diaphragm of reinforced aluminium foil at the back of the canvas, it is possible to reduce the cooling effect of the wall very considerably. The picture is then maintained substantially at air temperature and the possibility of moisture condensing upon the surface is greatly reduced.

It would be inappropriate to end this paper on the thermal insulation of buildings by a discussion of condensation upon pictures. The thermal deposition of moisture is, however, closely analogous to the thermal precipitation of dust [14] and the use of thermal insulation for the prevention of pattern-staining upon ceilings is now as well developed as it is for the prevention of condensation. Figure 3, which shows the ceiling of a building in London, a portion of which was treated experimentally, illustrated how the application of insulation not only renders the temperature of the ceiling more uniform, thus reducing the patterning, but also makes the temperature more nearly equal to that of the air and so decreases the amount of dust precipitated.

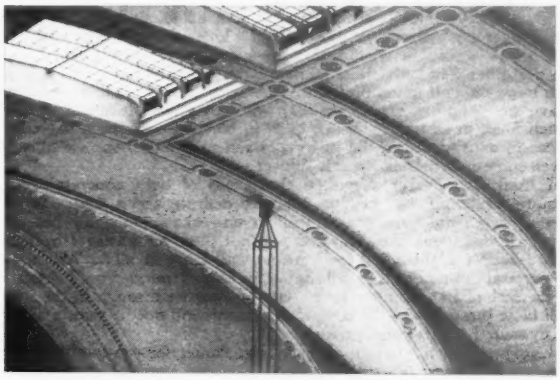


FIG. 3. *Ceiling showing effect of insulation upon pattern staining.*

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RECENT DEVELOPMENTS IN LIGHTWEIGHT CONCRETE*

Discussion following the Paper read at the R.I.B.A., on 22 November 1944 by T. W. PARKER, M.Sc., Ph.D., F.R.I.C.

DR. N. V. S. KNIBB : The Americans, who have been using light aggregates for a good deal longer than we have in this country, and on a much larger scale, use a workable concrete. Is that due to some local condition, such, for instance, as the fact that many of the light aggregates in America are expanded clay or expanded shale, which is in a more rounded form than the crushed foamed slag to which Dr. Parker has referred in his lecture? I think the rounded form of the grains would in itself make the concrete more workable. Or, on the other hand, do the Americans use workable concrete because it is more difficult to get uniform results with an unworkable concrete? Have they found by experience that, when they use a lean mix without much fines, in casting in situ or even in block construction, variations occur in density and in the properties generally? I hope we may be given some information on this subject.

I think Dr. Parker suggested that walls of light concrete would require rendering, but he was not very definite about that. In the case of a wall of light concrete of an unworkable mix, air passages occur right through the wall, and will not those air passages transmit sound almost as though there were no wall there at all? Will not it be necessary to render the wall simply to make it sound-proof? Again, in the case of an unrendered wall with air cavities through it, the wind will blow through and the thermal insulation will not be that of a wall as measured by its conductivity.

I noticed that the figures given by Dr. Parker for conductivity were rather lower than the American figures for light aggregates of the same density. The American figures which I have seen appear to conform to the Kruger and Ericsson formula for light concrete, whereas those given by Dr. Parker seem to be lower. Is that due to some particular property of the foamed slag, or, if not, to what is it due?

With regard to the question of frost resistance, is foamed slag frost resistant in itself, or are any of the other light aggregates frost resistant in themselves? If a lump of foamed slag was exposed to alternating freezing and thawing, would it break up as chalk does, or is it perfectly resistant in itself, so that the structure would resist if the bond was strong?

The lecturer said, I think, that a wall of 5 in. or 6 in. cast in situ would meet the requirements for a dwelling house, but that a block would have to be 9 in. Is that simply because blocks are made 9 in., or why is the greater thickness required? I should have thought that there would be greater strength in block construction than in in situ casting.

Is it correct to say that when blocks are used greater care is necessary to avoid shrinkage movements than when bricks are used? In bricks there is much more jointing, which has its own shrinkage, and, although the block itself shrinks more than the brick, will not the wall on the whole shrink no more, because of the smaller percentage of joints?

The lecturer was non-commital as to whether it is quicker or easier to build in units larger than bricks, but I think that is a point on which we should like to have some comment.

The lecturer said that the moisture movement in pumice blocks was lower than that of any other lightweight. Is, therefore, the moisture movement in these blocks partly due to the light aggregate itself and not due merely to the bond? If not, I cannot see why a pumice block should have any less moisture movement than any other lightweight aggregate. If, for instance, we have a block made with nothing but foamed slag with infinitely thin jointing material, will it shrink or not?

With regard to the question of proportioning the material, if we weigh the aggregate, as the lecturer suggested would be best, shall not we then get variations due to the fact that substances like foamed slag are not uniform in weight? There must be variations in the amount of foaming. The cement should certainly be weighed, but I should have thought that measuring the aggregate would give more uniform results than weighing it.

DR. PARKER : I explained that I had not personally seen the American development, and naturally in taking it only from descriptions I may have gone very far wrong. I think Dr. Knibb is right in thinking that there may be a difference between American practice and English practice due to one being largely in clay and the other in slag, because clay has a different-shaped particle from slag. Also, the Americans may have adopted the use of denser mixes in order to obtain better uniformity, but on the question of uniformity I can only say that British manufacturers do get a remarkable uniformity of strength in blocks. In connection with the wall tests which I illustrated in a slide, we selected from a pile of blocks which were being used at Elstree some one hundred and thirty blocks for strength tests, and their uniformity was particularly good, even though the selection was a random one. I think we could expect slightly more uniform results with the workable mix, but in practice I think the manufacturers in this country do achieve a very high degree of uniformity in blocks.

There is one other factor, and that is the size of the block. The American block comparable with the cored one which I showed weighs about 30 lb. or less, the size being 16 in. by 8 in. by 8 in. If it were 18 in. by 9 in. by 9 in., it would weigh considerably more; it might weigh over 40 lb., and it would then be difficult for one man to lift and handle.

Perhaps I ought to have been more definite about rendering. All the evidence at the Building Research Station is that with the present form of blocks rendering is desirable, and I think as a general practice the walls should be rendered until complete evidence is available to show that rendering is unnecessary.

With regard to the conductivity figures, in a material like this, as you know, the thermal conductivity varies a good deal with the moisture content, and the conductivity figures that I have given are all on materials which have been matured in a relative humidity of 65 per cent., and a temperature of 64 deg. F. That corresponds with a free water content of 4-5 per cent. in foamed slag blocks. The tests are standard National Physical Laboratory tests, and the results fit in quite well with the results of similar tests that we have done in conjunction with the National Physical Laboratory on pumice concrete and lightweight clay slabs. I know the American figures are higher than ours, but I do not understand why that is so.

I cannot answer the question with regard to the frost resistance of the material itself. I have not seen any piles which have deteriorated through frost, and the fact is that there are in expanded slag and also in clay very large sealed pores; in other words, the material is porous but the pores are not fine pores, and it is the material with fine pores which is liable to be destroyed by the action of frost. These large pores are so large that they do not become sufficiently full of water to be filled up and cause the material to break when the water freezes.

With regard to the question of having greater thickness in a block wall as compared with a wall cast in situ, there are two reasons for that. In the case of a wall cast in situ, one does not have the factor of strength-of-unit against strength-of-wall coming in. The other reason is that the blocks are in fact cored; the total solid thickness is only 4 in., not 9 in.

As to shrinkage, there is a difference in shrinkage as the aggregate is varied. I do not think it is a question of the shrinkage of the aggregate itself. It may be a question of the distribution of the cement over the surface of the various aggregates. But it is a fact that, as between one lightweight aggregate and another, or as between one heavy aggregate and another, there are slight differences in the shrinkage, even with comparable mixes.

The speed of erection of blocks is, of course, a very thorny subject, and it is one on which I have personally no information at all. My information is only secondhand. It is strongly held in America that it is quicker to erect in blocks than in bricks, and figures are given to show that there are advantages in the former method, but whether in fact those advantages would hold good in the case of small house building I do not know, and I have no evidence about it.

With regard to proportioning, I am inclined to agree with Dr. Knibb that there is a certain amount of variability from one batch of lightweight aggregate to another, so there may be some difference in the weight per cubic foot, but when a plant is running continuously the slag composition does not change much. The operations on the whole do not change very much, and as between at least three or four test batches we have found very little difference in the weight per cubic foot of the slag, but such differences can occur in the manufacture of

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lightweight slag and clay and slate. It is a point that ought perhaps to be checked, and it may justify us in continuing to proportion by volume, but I think the cement certainly ought to be proportioned by weight.

MR. GALLAI-HATCHARD : I should like to say a few words in support of the lecturer's statement about the advantages of the lightweight concrete as compared with the American denser concrete. I agree with his view as to why American units are heavier. Crushing lightweight aggregate is a very difficult problem, and when it was started in this country we produced a very great excess of fines. On the other hand, we intended to copy the German practice of lightweight concrete, which was based on pumice. Pumice has very small quantities of fines and is excavated in ordinary open pits. That is the reason why the pumice technique produced lightweight concretes, and that is the reason why the German foamed slag producers tried to imitate the pumice technique and adopted the lightweight honeycomb concrete. There is no doubt whatever that this is the right method. The only question is whether we can adopt it successfully. The difficulty was that we produced far too much fines. We looked into the question, and I think that in this country we solved the problem of how to crush lightweight aggregate. It appears to me that neither in the foamed slag production nor in the " Haydite " production have the Americans achieved a proper crushing technique, and they therefore have a lot of fines. They have to sell it, and in order to sell it they have to add it to their mix. The moment one adds more fines to the mix one weakens the slabs, and therefore has to add more cement. This is a vicious circle, and it introduced into the American technique the heavy unit, which, as far as insulation is concerned, is inferior to the English practice, and, as far as strength is concerned, is far above the strength which is required. I think that may answer one of the points raised by Dr. Knibb.

MR. H. H. JUDSON : Is reinforcement used with the lightweight concretes ?

DR. PARKER : Reinforcement can be used and is used in lightweight concrete. It has a beneficial effect in distributing shrinkage cracks, in just the same way as in the case of dense concrete.

In the case of the reinforcement of lightweight concrete, it is important to remember that one is dealing with a porous material, and, that being so it is essential to make sure that there is sufficient protection against the atmosphere to prevent corrosion. The point was raised in the early days, in the case of slag concrete which contained sulphur, whether the sulphur would cause corrosion of the steel, and a long investigation was made to show that in fact no harm was done to the reinforcement by the sulphur in the slag concrete.

The floor which I showed in one of the slides is quite heavily reinforced with pre-tensioned steel.

MR. R. A. DUNCAN : In the case of the Fire Offices' Committee's Testing Station, where ordinary reinforced concrete was used with a slab in between, is there a tendency for the two materials to tear ? Is there any sign of cracking at the junction between the two different concretes, or is that at all likely ?

DR. PARKER : In the building to which you refer that has not happened, but I agree that it might happen. It would be the normal practice, with a material like the one in question, or a wood-wool slab, to arrange to have the fine crack just at the junction, but it happens that in the Fire Testing building there is not a crack in that corner at all. I think the only cracking is in one of the small offices, where there is the tiny crack just under the window that one sometimes sees in a concrete building.

MR. C. C. HANDISYDE : The lecturer referred to cement, but not to any particular kind of cement, and I should like to ask whether there are any advantages or disadvantages in using any particular kinds of cement in conjunction with foamed slag ; for instance, ciment fondu and other special types.

Secondly, in the case of rendering, is there any advantage or disadvantage in using a foamed slag sand for the rendering ?

The lecturer referred to the fact that concretes made of lightweight aggregates were easier to render than normal concretes, but he also referred to the water absorption of those aggregates. Does that absorption affect the plastering technique ?

The lecturer disposed of the question of unsoundness in clinker on the ground that a British Standard Specification for clinker aggregate had been issued, but I think he is perhaps a little optimistic in this respect. It seems to me that it depends on whether either all the makers conform to that British Standard Specification or all the architects demand that they should do so.

DR. PARKER : With regard to the cement, of course most of it is Portland cement, and, as in every other case, I think there are differences which cannot be defined easily by the laboratory between the use in practice of one cement and another with lightweight concretes. Our own laboratory people say they like to use X cement better than Y cement with foamed slag because it is a little more workable, and so on. I think those differences do exist, but they are not very significant, and any normal Portland cement is quite effective.

There is a very interesting chemical question in connection with ciment fondu. As a matter of fact, about ten days ago a paper was read at the Roads and Buildings Group of the Society of Chemical Industry in which reference was made to fireproof concrete, and Mr. Hussey, the author of the paper, quoted some good results he had had from mixtures of ciment fondu and foamed slag. My own view is that the use of ciment fondu with foamed slag ought to be treated with considerable caution. I think it is quite possible that with the existing wartime slag compositions, and so on, there is no harm in the conjunction of the two, but I think as a general practice it is wrong, because it is a fact that a high-lime slag can upset the setting time and the strength of ciment fondu very considerably. High-lime slags are the very best type for making foamed slags, and if there were any further developments in this country which involved the use of high-lime slags I think it might be a doubtful proposition to use them with aluminous cement.

With regard to rendering with foamed slag sand, I did not include in my table of data some strength tests which were carried out at the Building Research Station on mixtures of cement and slag, cement, lime and slag, and lime and slag, where the slag was used as a substitute for natural sand. Foamed slag has a hydraulic effect, so that a lime-slag mix will harden up and so will a cement-lime-slag mix, and it apparently works efficiently in a cement-slag mortar alone, for the result is practically identical in strength with what we should get with a cement-sand mortar. But these are laboratory data, and in practice the workability of a cement-slag or a cement-lime-slag mortar is so poor that difficulties begin to arise. In order to get anything like a workability comparable with that of a lime-sand mortar, we should have to enrich the mortar so much with lime that it would be hardly worth while using it. The slag aggregate has been used and I dare say it can be used effectively with the Continental technique of throwing on, but our own view, from such practical trials as we have made, is that it is not worth while to use it. It is harsh working and it does not give any particular advantages over an ordinary sand.

With regard to the plastering technique, the blocks are very highly absorptive of water, but, as often happens, they have little or no suction, so a slight modification is needed. The mix does not require to be so wet as it would be with brickwork. The mechanical adhesion with the rough surface of the concrete seems to be particularly good, and I think that is the reason why these lightweight concretes are good bases for plastering.

DR. K. HAJNAL-KONYI : Has the lecturer carried out any tests on the nail-holding properties of foamed slag concrete ?

DR. PARKER : Only qualitative tests, but I think I could quote the experience of Mr. Gibson, who used a considerable amount of foamed slag in his war-time houses, and found the nail-holding good, especially if he introduced a small quantity of fine sand into the mix. I think the mix was 1 : 4 : 8 by volume, and one part of fine sand was added to that. All these lightweight concretes are nailable and also cutable. Their nail-holding properties cannot be compared with those of timber, but they do take nails, and in suitable cases plaster boards can be nailed into them, and door frames can certainly be nailed into them.

THE CHAIRMAN : A wall of foamed slag with a rendering on it as the sole weather protection is something of which we architects would be rather afraid. We have had so much experience of 9-in. brick walls and the water coming straight through that many of us have said : " Never again will we have anything but an 11-in. cavity wall." It is rather surprising to me to have a single wall with rendering offered to us, especially as it seems that it is only the rendering that is protecting it from the weather, and without the rendering the wet would come straight in. Does the lecturer still advocate that ?

DR. PARKER : Yes. I think the answer is that even if some water gets through the rendering it will not meet a capillary path, such as it would meet in brickwork, and be attracted right through. It will meet a bed of stone and trickle down. There will not be streams of water through the rendering in any case. Even if the rendering is slightly permeable, the water will just trickle in and come out again. There is a considerable amount of experience of rendered walls which are perfectly dry.

THE CHAIRMAN : So you feel you have given us, as it were, a hollow wall technique by the rendering plus the porous block ?

DR. PARKER : After all, the wall from the rain penetration point of view is virtually no different from a no fines concrete wall, of which there are numbers in Scotland in very exposed positions, with only rendering on them and perfectly dry.

THE CHAIRMAN : Would you recommend any particular detailing at the opening?

DR. PARKER : I am afraid I am not competent to say that.

THE CHAIRMAN : That is going to be the weak point, is not it?

DR. PARKER : Yes.

MR. GALLAI-HATCHARD : With regard to rendering, that is one of the most important points in connection with foamed slag, and perhaps I might relate an actual instance of it. Mr. Arthur James built a house in foamed slag near Godalming, and it was agreed to render it with what is called a breathing rendering, because we took the view that we much preferred water going into the building, as if it went in it would come out. About a month after the rendering was completed, Mr. Arthur James rang me up in despair and said that the house was full of moisture. I went to look at it and I examined the rendering with a magnifying glass and found it was full of cracks, because the mortar had been pressed to such an extent that the water had been squeezed out and the cement crazed. A conference was held with the rendering firm ; it was then November, and I suggested to the general despair of everybody concerned that the best thing to do would be to tear off the whole of the rendering at once. Some doubts were expressed about that at first, but Mr. James agreed to it. In a fortnight the building was bone dry, and it was rendered in the following June with a proper rendering. That proves that a bad rendering which traps the water is dangerous. We are terrified to hear about so-called waterproof rendering, because if there is a waterproof rendering and it crazes the moisture will penetrate and spread in the wall, and with this waterproof curtain it will not be able to escape. This is the reason why we must revise entirely our ideas in regard to rendering in connection with foamed slag, which is an entirely different material. We have proved that if a wall is rendered inside and is not rendered outside the rain will not penetrate. I quite agree with the lecturer that it is not a method which should be advocated from the aesthetic point of view, but we maintain that for utility buildings, where aesthetics are of secondary importance, foamed slag walls of at least 4 in. thickness, rendered inside, are satisfactory, as they remain dry.

DR. PARKER : I do not agree with rendering inside, but I confirm that porous cement-sand-lime rendering does keep the wall dry. The Building Research Station test in which the wall is streamed with water for six hours is very extreme. In those circumstances water will pour through an ordinary 9-in. wall of brickwork inside half an hour. If the wall stays dry for, say, six hours in the test, one may take it that it is unlikely that rain will penetrate in practice. The test specimen is only 8 ft. by 4 ft., of course, and on the larger practical scale there may be difficulties through possible defects of detail, but the basic principle of a soft rendering on a solid lightweight concrete wall (it applies to other lightweight concretes and not only to foamed slag) seems to hold good, and it will be dry in the same way as a no fines concrete wall will be dry.

COLONEL A. F. HOOPER : If these blocks have to be carted to the job in the same way as bricks and they are not very different from bricks in size, will the post-war housing actually be more economical with these foamed slag blocks than with good bricks?

MR. H. H. JUDSON : As the lecturer has expressed a preference for lightweight concrete walls over 11-in. cavity brick walls, I should like to ask in what respect he considers them to be superior. Is it in time or cost or durability or performance? Is not a large experiment by some authority required before we can say what advantages are to be gained by the use of lightweight concrete walls?

DR. PARKER : The major advantage is in thermal insulation. The insulation of the cored block is very close to the standard which the Burt Committee thought desirable, that is, a "U" value of 0.2. In the case of an 11-in. cavity wall, if one wanted to bring the insulation up to that value it would be necessary to put on fibre board or something like that.

MR. R. A. DUNCAN : I should like to support Dr. Parker, because the whole question of insulation is going to be of vital importance. The cost of heating houses will be a very important factor. Having regard to the cost of fuel, if we are going to raise the standard of heat comfort generally some form of insulation without putting up the cost of the house is of vital importance.

CORRECTION

We are informed by Mr. Derek Bridgwater [F.] *that Dr. Parker's reference to him (in his Paper published in the December Journal) as the architect for two agricultural cottages at Timberscombe, Somerset, is incorrect. Mr. Bridgwater, in fact, acted only as consultant to the firm supplying the foamed slag blocks. The cottages were designed by Messrs. Woodbridge & Riches, Registered Architects.*

CONCRETE, ITS APPEARANCE AND DURABILITY*

Discussion following the Paper read at the R.I.B.A., on 29 November, 1944, by NORMAN DAVEY, Ph.D., F.S.A., M.Inst.C.E.

MR. F. J. SAMUELY : I am glad Dr. Davey mentioned that not too much cement should be used. I think it is unfortunate—and I should like to know what attitude the B.R.S. takes about it—that most of our bye-laws allow higher stresses on a concrete which has more cement, though actually it is the cement/mortar ratio which determines the strength of concrete, and so people are induced to use a great deal of cement when it is not necessary to use so much.

With regard to the dryness of concrete, very often local authority surveyors insist on a rather wet mix because they rightly say that if a dry mix is used there may be voids in the concrete, which would not improve it. Dr. Davey mentioned that point. The better procedure, however, is to insist on good ramming or vibration of the concrete, in which case it is possible to produce a very good concrete with a dry mix.

With regard to form work, tongued and grooved boards are usually somewhat expensive to use, and it is very rarely that one can afford them, but there are other methods of getting a good, smooth surface. Masonite lining may be used or shuttering may be steel lined, in which case very much larger panels can be produced, and so on. An interesting surface has often been obtained by lining the inside of the shuttering with sandpaper, corrugated paper or some similar material. Canvas, hessian and so on have been used.

For getting a rough finish there is one method which the lecturer did not mention : the use of retarding chemicals. This method is much used in France. It probably requires very careful handling, but in some cases reasonably good results have been obtained. The cement is retarded on the outside, and after the shuttering is struck, after two or three days the cement can be scratched away easily. The danger is, of course, that too much or too little of this material is provided. With too little no effect is produced, and with too much the whole concrete might be spoilt.

Another point of interest is the coloured surface. Sometimes both coloured cement and coloured aggregate have been used. As a rule these methods are rather expensive. One method of cheapening the process is to use sliding shutters. The coloured concrete is put on the outside of the sliding shutter and the shutter is then pulled upwards. In that way only one inch or less of the depth of the concrete need be done in the special mix.

There is one question on which I should like to have the lecturer's opinion. When should concrete be used for large surfaces, for walls and so on? There are some problems there. Very often concrete has been spoilt not so much by the effects resulting from the concrete as such but merely because it has been so rigid that even a slight settlement of the foundation leads to cracks, and when cracks start, water starts discolouration and so on.

With regard to fire-resisting qualities, there is a rather remarkable discrepancy in most of our bye-laws, especially for multi-storey buildings, in that 8 in. of concrete or brickwork is regarded as fireproof for external walls, or alternatively 4 in. of reinforced concrete, whereas actually 4 in. of reinforced concrete is very much less fireproof than an 8 in. concrete wall. I wonder whether there is any special reason for that provision.

I do not know whether the lecturer would care to say anything about the hardening of surfaces by metal powder. That has been used for some surfaces, and I have had some good experiences, but I do not know whether they are representative.

DR. N. DAVEY : I must admit that I left out a number of things, of which waterproofing is one. Waterproofers, needless to say, should not be used if the job can be made waterproof without their use. It is possible to make quite good concrete tanks by careful grading and compaction and careful design of the mix, and in those conditions waterproofers are not essential.

I have not dealt with strength. I quite agree that strength and appearance do not necessarily go together.

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A number of jobs have been done in London with the Masonite lining which was mentioned. Sainsbury's factory at Blackfriars is, I understand, a case in point. Lining materials have been used, and some very interesting textures have been produced with crêpe rubber, among other things, or corrugated rubber. The only trouble is the crinkling in the forms; it is very difficult to fix them uniformly and hold them in position during the deposition of the concrete, and one is inclined to get a wavy surface or creases marks on the surface of the set concrete. I have not dealt with sliding shutters. That method has many uses, but I understand that it is not always easy to apply.

For fire-resistance I agree that an 8-in. brick wall is better than a 4-in. reinforced concrete wall. There seems, therefore, to be a slight discrepancy in the bye-laws, but I hope that many of these irregularities in the bye-laws will be cleared away as a result of the research work which is being carried out on the subject.

With regard to metal powders for hardening, a number of proprietary processes have been used. One which comes to mind involves the trowelling of cast-iron filings into the surface of the concrete; or, alternatively, carborundum may be used.

Mr. W. A. Forsyth [*F.*]: Is Dr. Davey in favour of an absorbent aggregate? I have been working with brick-concrete and with crushed sandstone concrete, and I find that they have certain advantages. With brick-concrete and with absorbent aggregates generally there is a structural combination between the matrix and the aggregate; with ballast, which is non-absorbent, there is no such structural combination, but merely adhesion. The softer aggregates, such as brick, are lighter in weight. Brick has good thermal properties and has less tendency to sweat, and it is less resonant. It has greater fire-resistance than many other materials. That is the only condition which I find that engineers will accept—that its fire-resistance is greater than that of ordinary aggregates. It can be repaired, by reason of its suction, in a way which is not possible when ballast is used, and it will take plastering or rendering quite easily. I think it is subject to less shrinkage. With brick concrete I should be inclined to use an angular sand; I think that that would go better than a rounded sand.

The illustration from Naples of the breakwater which we have just seen, and which is nearly two thousand years old, is not reinforced, and it has lime mortar. That has stood the test. We have had very little test yet of the combination of cement and ballast and ferrous metal, such as steel, which is the most rustable form of ferrous metal, except that one sees now and again some failures which have been up for about thirty years. I went with Dr. Davey to see an instance of that on the Thames, a concrete silo where the cover was insufficient and the whole thing is coming to pieces.

My last observation concerns slab finish. I understand that all the examples which Dr. Davey has brought here are cast in situ. A building was recently illustrated in the Press which is called the Citadel, an Admiralty building. It is a production with which the architect had comparatively little to do, but the architect had a good deal to do with the finishing of it. The facing is a slab 3 in. thick and 3 ft. by 18 in., and two of those when placed in position coincided with a 3 ft. lift in the concrete, which is cast up to the slabs. The slabs are used there as the centring or form work. No ordinary form work was used, except that the slabs were strutted as they were erected, and the concrete cast up to them. That is all that one can say about that building, but it is an instance of where the slab has been used as the form.

Dr. N. Davey: I think that slightly absorbent aggregates are preferable, and, from the point of view of appearance, particularly aggregates which tend to "dust" slightly during the course of time. I have a sample here of limestone aggregate, and I am fairly certain that if that were exposed in London a slight chemical action would take place which would lead to dusting of the surface. That would tend to keep a clean finish. The same sort of thing happens with some of the bricks.

I agree in general with the remarks made about a brick concrete. It certainly is more fire-resistant, and, if I may refer back two thousand years, the Romans realised that fact and used brick concrete, of lime and crushed brick, for their hypocaust flues. They also used brick and lime mixes wherever they wanted an impermeable concrete. The lower course of London wall, where the ground is waterlogged, was made with tile mortar. For rendering a damp wall they would use a tile mortar mix. Similarly for torching the tiles on roofs. The idea did not start with the Romans; the Minoans appear to have mixed crushed tile with their mortars in Crete, possibly 5,000 years earlier.

Mr. Vicars Lobb [*F.*]: I should like to raise the difficulty of providing an adequate key to the under-side of the in-situ floor for subsequent plastering. A contractor of considerable repute mentioned to me the other day that he had laid a layer of an inch or so of three-quarter no-fines ballast over his form-work before the in-situ concrete had been placed. A certain amount of the fine material and the water from the in-situ concrete found its way down through to the form-work, and when this was struck it gave a finish which was satisfactory for plastering without any hacking or anything of that kind. I was very sceptical about the treatment, and I should very much appreciate the lecturer's opinion of it.

Dr. Davey: I see no reason why that method should not work satisfactorily, provided, of course, due allowance is made in the design; that is, that something extra to the normal cover for the steel is put in. The usual way, of course, of providing a way for plasterwork is to apply one or other of the proprietary solutions mentioned by Mr. Samuely. They must be applied evenly to the form-work, otherwise the work will be patchy.

Mr. S. B. Caulfield [*F.*]: A method of putting broken brick on the shutter before the floor is laid was used by the London School Board fifty years ago, and I believe with entire success. The brick, of course, was very thoroughly wetted; in fact, I believe that all the aggregate was put into tanks of water before it was put on to the shuttering.

I should like to ask one question about the tile string, which makes a very interesting junction for the lifts. Would not that be rather dangerous with reinforcement? The tile being so absorbent, it would carry water to the interior.

Dr. Davey: I think the answer there is that the particular monoliths shown in the photographs were not reinforced; otherwise I imagine that that would be a serious difficulty. I do not think the method would have much to recommend it where reinforcement was used. The tiles went in only about 2 inches in the example illustrated.

Mr. C. C. Handisyde [*F.*]: This is a question not so much to Dr. Davey as to any other architects who have information on the point. Dr. Davey has given us a list of things which should and should not be done—the selection of aggregate, the control of water-content and things of that kind. What I should like to hear would be the experiences of architects in achieving the desirable conditions on actual jobs. I am thinking not of the large job where there is a resident engineer, or even of the size of job where there is a really good resident clerk of works, but of the sort of everyday job that we have to do either under direct control from an office or with rather inferior site control. How do people in fact satisfy themselves that they are getting the aggregate which they have specified, and how do they satisfy themselves about such things as water-content?

Dr. Davey: Good finishes cost money, and unless clients are prepared to pay for good finishes they are not going to get them. Good finishes, moreover, require close supervision and excellent workmanship. You cannot let up on the job at all, and I am afraid that that must mean extra cost and supervision. How that is to be achieved under present conditions is not clear. They manage to do it in America and on the Continent, but so far I cannot say that we have succeeded here.

The Chairman (Mr. C. G. Stillman [*F.*]): Can they do it with these smaller jobs in America?

Dr. Davey: I think that their precast work is good. This country is now producing some excellent precast slabs for housing; one or two firms are already doing this sort of finish, and that is one of the easy solutions at the moment—the precast slab which can be used for in-situ form-work.

Mr. Handisyde: I think that to talk of precast slabs is to avoid the issue.

Mr. Hartland Thomas: The answer is that it can be done only by persuasion. If you have something which you want done in not quite the usual way the architect must explain to the foreman just why he thinks it important that it should be done in that way, and must endeavour to convince him. If the architect gets the foreman to understand and gets him on his side, it is all right; if he does not, it is not.

Mr. Anthony Pott [*A.*]: Since Mr. Handisyde has invited us to be auto-biographical I should like to mention my own experience, because it ties up with what Dr. Davey said about concrete in cold weather. I was resident architect on a certain job during the war, and it was a bad winter and we were being urged to get on with the work. The contractor was anxious to continue with concreting, and his foremen were equally keen, and so we devised some very rough *ad hoc* measures. Dr. Davey referred to his measures as rough; ours were considerably rougher. I read Dr. Davey's notes from the Building Research Station about concreting in cold weather and the dangers of getting flash sets and so on. A large number of brass-case thermometers were handed out; every man in charge of a mixer had one and each ganger and foreman had one, but when we went to the mixer and asked for a thermometer to take the temperature, either it was lost or was in the general foreman's office, three-quarters of a mile away.

I think the only thing to do is for architects to insist on concreting becoming a craft, a trade, an up-to-date scientifically-based trade. One cannot expect anything from a man who is just a labourer and who is put on to the concrete mixer, and one cannot begin to teach him concrete work from the start. If architects want good concrete, they must encourage the training of operatives in concrete work.

There are two questions which I should like to ask. I believe that some engineers will not allow bush hammering as a surface finish for fear of impairing the bond between the reinforcement and the concrete and I should like to know what Dr. Davey has to say about that. Secondly, is it a fact that concrete made of a brick aggregate has a lower conductivity than other dense concretes of comparable weight?

Dr. DAVEY: I suppose that bush hammering must reduce the effective cover. The mere fact of hammering a concrete must bruise it in some way, and proper allowance should be made for that. If you are going to bush hammer a reinforced concrete structure you might have to have 2 in. of cover instead of 1 in. Experience will guide you as to the proper allowance. For that reason it is not favoured by many structural engineers, and rightly so; it is more suitable for monolithic unreinforced masses. With regard to the thermal properties of brick concrete, perhaps Mr. Pott could give us some information.

Mr. POTT: The conductivity of brick is higher than that of normal dense concretes, and therefore why, if you use a brick aggregate, you should get a better insulating material I do not know.

Dr. DAVEY: I do not think that that is the entire answer. There must be some bricks which are more suitable and have better thermal properties than others. Concrete made with brick aggregate is generally of lighter weight than concrete made with natural stone aggregates, and for that reason may be expected to possess better thermal insulating properties.

Mr. W. ALLEN [*A.*]: Mr. Samuely raised the question of how big should an area of a concrete surface be and the obvious question of what happens when the building settles. There is nothing more fatal to the appearance of a building than a completely smooth texture over about a hundred square feet with one crack across it. First of all, one should pay attention to the foundation, and perhaps approach the question in a radically different way. I know that in some cases Dr. Terzaghi, the soil mechanics engineer, has used foundations which are carried on jacks, and a constant adjustment is maintained in relation to the settlement of the building; as the building takes up its first settlements, the unevenness in the pressures is taken up. An obvious deduction from that is that one might use resilient foundations and allow the pressures to be taken up more easily, and eventually the bigger adjustments might be taken up by jacks.

You have in reinforced concrete a very useful aid to that sort of design, because if you are dealing with a true monolithic structure, turning the walls into complete reinforced concrete beams, you have a highly rigid superstructure which sits particularly well on a resilient foundation without, I should imagine, any particular trouble. We have heard of resilient foundations in connection with cork, but that is not a true resilient and tends to flow.

On this question of foundation design, it seems to me that both architects and engineers are missing the point that in spite of the fact that it is below ground it is part of the design conception, and almost of the æsthetic conception of the building, the structure in relation to the way it is poised on the ground.

There is another approach. One usually has to break up anything which is so continuous as a reinforced concrete building into individual lengths to deal with thermal expansion problems. One has to do that in relation to the roof and carry it down the walls, and one has to think of what happens when it meets the rest of the frame. It is necessary to divide the frame, and it seems to me that something like a reasonable result will probably be achieved by having rather big units, perhaps of 50 ft. to a maximum of 75 ft. in length.

In any case you could approach the design of a building in those two ways. We are only in the early stages of concrete work. I was staggered to see how far the Romans had got when I saw the picture of the breakwater which Dr. Davey showed us. The Roman one looked better than the other.

I think Dr. Davey went with others to see the Roche Products factory at Welwyn Garden City when it was being erected. They made a test of one of the tenderers for the contract by allowing him to erect a reinforced concrete wall along one side which had raised ridges running continuously along the concrete at about 9-inch intervals, a ridge of about ½-inch protruding. It called for a bead joint in the boarding, and they left the contractor to get on with it himself. They suggested that it might be advisable to oil the boarding, but I do not think that he thought so, and he carried on. What he got was an expansion of the timber boarding which broke off about 30 to 40 feet of this ridging and moved some of the rest of it up a little before the concrete had set far enough to be broken completely. The result was a most curious wobbly line, where there was a line at all. I do not know whether Dr. Davey would care to say anything about that characteristic of timber shuttering, but it is a point to watch if you are going to use a protruding ridge.

Dr. DAVEY: The last point which Mr. Allen mentioned is obviously one to watch. I imagine that the thorough soaking of the formwork the day before should help. You can either soak with water or prevent the water coming in at all by treating the surface with oil. Which is the better way I am not quite sure, but I think that I should prefer thoroughly to oil the forms first, to stop the water going in.

The point about the foundations is an important one, but is rather outside the scope of this lecture. The character of the ground will obviously determine the size of the monolith which one can conveniently place, but I am not in a position to say what is the ideal length.

Mr. LOBB: I should like to go back to the point which Mr. Handisyde made about controlling the concrete. Apart from the persuasiveness which Mr. Hartland Thomas mentioned, I think that the elementary precautions of having a slump cone and two sets of cubes on the site, and having graduated glasses and if possible a clear glass bottle with a chemical solution giving you the test for the organic content of the sand, are a very great help. If that simple apparatus is available, it is very easy for the architect on his weekly visit, or for the clerk of works on larger jobs, to maintain some control, and the fact that you do descend on the site and ask the builder's foreman for the slump cone and take a test and if necessary tell him he will have to take a bay out is something which he will bear in mind in future. If you are taking cube tests, you need not necessarily send them away for testing, which is a somewhat expensive business if you are taking a large number of them; they can be stored, and in the event of difficulty arising with the concrete they can be tested. I have found on aerodromes, where we lay large areas of concrete, that that process has worked. Perhaps to some extent it works by the fear motive rather than by persuasiveness.

Mr. SAMUELY: With regard to the point which was raised about foundations, I am afraid that except on a very large building it is questionable whether one could afford jacks under the foundation, as suggested by Mr. Allen, and I do not think that even Dr. Terzaghi would suggest it; but as far as resilient foundations are concerned there is a building—Gilbey's, at Camden Town—which has been built in this way. Actually the expansion joints were at 70-ft. centres from each other, and the building has settled, but not cracked, although it was on 1-in. cork; but I think that that is because the ground was good. I do not think we can take it for granted anywhere that we know the ground so well that we can be absolutely sure that big areas of concrete will not crack due to subsequent settlement.

The CHAIRMAN: A point which interests me, as it must most architects who are doing work of a more strictly economic character, for which these types of finishing are too expensive, is that which Mr. Handisyde brought up of the small job where, even though there may be a clerk of works, it is difficult to control the concrete. Concrete is a very economical material for floors such as granolithic floors and staircases, but there are problems such as slipperiness, particularly with concrete stairs for schools, and dusting and so on, and these things are very difficult to control.

Further, with regard to waterproofing concrete, I have had some problems with regard not to waterproofing but to damp-proofing concrete, as for example for basements where paper and records have to be stored. There you have the problem of whether you can really get a damp-proof surface with concrete alone, without some waterproofing liquid. A great many architects must have had problems of a similar character, problems which arise on the smaller jobs, and which really come back to supervision and care and perhaps co-operation with the contractors and the foremen and the men who are doing the work.

If often happens, in my experience, that concreting work in building is treated rather casually and not given the attention and thought and care that it requires. I agree that it is in fact a highly skilled craft, and we really ought to treat it as such and have men who understand the use of concrete in the smaller buildings. I am not thinking now of large engineering works, but of the smaller jobs where we have to deal with the smaller builders and the local men.

A vote of thanks to the lecturer, proposed by the Chairman, was carried with acclamation, and the meeting then terminated.

THE MONUMENTS OF CENTRAL ITALY

Fourth Report from the Civil Affairs Department of the War Office *

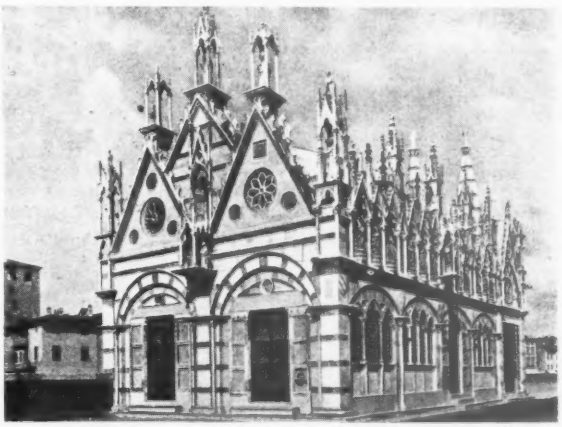
Reports already published have covered virtually the whole of the province of Lazio in so far as it was affected by the war; of the listed monuments not described in those reports but visited since by the officers of the Monuments, Fine Arts and Archives Sub-commission, the church of S. Rocco and the 15th century Castello Massimo at Arsoli with its Zuccari frescoes have lost only some tiling and window-glass; the church of S. Agostino at Amatrico, Cittaducale, with its castle of King Robert the Wise and three fine churches, Amatrico, Riofredda, Borgo Collegegato and Vicovaro with its octagonal Renaissance chapel by Domenico da Capodistria, are all intact.

The provinces of the Abruzzi and Molise have come off lightly. Aquila, boasting 16 listed monuments, Atri, Sulmona and Vasto, each with five listed monuments, Lanciano and Teramo with four each, Celano, with the churches of S. Giovanni and del Carmine and its Castle, Capestrano, with its castle, the convent of S. Giovanni and the church of S. Pietro, Notaresco with S. Clementi al Vomano and Sta Maria of Propezzano, Pentima, with its basilica, museum and Roman remains, and Rosciolo with two churches, the abbey of Sta Maria di Cartignano at Bussi, the mediæval fountain at Fontecchio, the Palazzo Ducale at Tagliacozzo, and churches at Assergi, Bazzano, Bominaco, Citta Saut'Angelo, Loreto Aprutino, Luco ne'Marsi, Moscufo and Pianella have all escaped damage.

On the other hand, the Cathedral at Ortona with its 13th century portal by Nicola Mancino and the fine Romanesque church of Sta Maria at Giulianova are ruined. At Alfedena the 15th century church of SS. Pietroe Paolo was demolished; the important archæological museum was damaged but most of its contents are safe. At Carsoli the 14th century Palazzetto Orsini is completely destroyed, together with the mediæval houses fronting on the square; luckily the 12th century church of Sta Maria in Cellis escaped injury. In all other places recorded the damage is repairable. At Tione the Germans wantonly set fire to the 13th-14th century church at Sta Maria del Ponte in order to annoy the people and the priest, who was compelled to witness the outrage; actual destruction was confined to the roof. At Guardia-grele two important churches suffered; the 14th century portico of the Sta Maria Maggiore is lost, but the rest of the façade needs only slight repair; the roof and vault of the somewhat earlier church of S. Francesco are badly damaged, but the west end and the portal are intact. At Popoli damage to the church of S. Francesco and to the 14th century Taverna Ducale does not extend beyond the roofs and windows, and local resources can cope with the repair of both monuments. Castel di Sangro has suffered severely; the only undamaged church was, however, the only one listed as being of great importance, namely the Cathedral, which had a miraculous escape; only the sacristy was burnt; the two Solimena pictures and the fine gilt paliotto were unhurt, and the Renaissance porticoes also were not injured.

In the province of Le Marche the record is on the whole encouraging; the three bridges at Ascoli Piceno were destroyed by the retreating Germans, but the town is intact, as are Macarata, Recanati, and Formo, all minor treasure-houses of mediæval art; Tolentino, with its duomo enriched by frescoes of the Pinturicchio school, its magnificent 13th-14th century church of S. Nicola and its Renaissance Museo Civico, and Lesi with its mediæval walls, its splendid Palazzo Della Signoria, its churches and its picture-gallery containing Lorenzo Lotti's works. Urbino had a narrow escape. The Germans mined all the city walls, but only the mines at the S.W. corner of the city exploded, the rest being removed in time by British sappers; damage was thus limited to the destruction of some 200 yards of the wall and the breaking of windows; otherwise all the monuments, galleries and archives and treasures in the galleries and museums which were stored in various places are unharmed. Archevia, Genga and Sassoferrato, little places each possessing a fine church, also escaped damage.

A really lamentable loss to art was involved by the bombing and shelling of Ancona, a city rich in architectural monuments, which was obstinately held and had to be captured at all costs. Of the 15 buildings listed as being of first importance the church of S. Agostino with its late Gothic portal, the 15th century Palazzo Benincasa, the Palazzo Ferretti and the Arch of Trajan escaped damage; Santa Maria della Piazza, the most important monument in the city with its elaborate early 13th century façade adorned with sculptures by Master Philippus (which



Pisa: Sta Maria della Spina

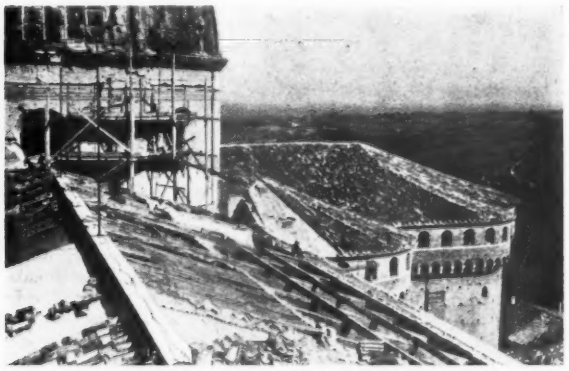
had been carefully protected) suffered only slight blast damage to its roof; the Cathedral (S. Ciriaco) lost its roof and the end wall of the chapel of S. Crocifisso in the South transept collapsed and fell through the floor into the crypt; fortunately the two inner arcades are for the most part intact and the church can be restored with little loss of character. In S. Domenico the false vaulting of the nave has collapsed, but the internal decoration below cornice level has suffered relatively little. San Francesco della Scala had its campanile destroyed, leaving a gap in the south wall of the church, but for the rest there was only minor blast damage and the façade with the Gothic portal by Giorgio da Sebenico (1455) was unharmed; the east wing of the cloisters was destroyed, together with the whole of the west range of the convent attached. Santa Maria della Misericordia was destroyed beyond the possibility of restoration. The Palazzo Comunale had its interior badly smashed but the façade was preserved; it dates from the late 13th century but the reliefs which decorate it come from the earlier palazzo built by Margaritone d'Arezzo in the 13th century. The west wing of the fine Palazzo degli Anziani (the Prefettura) was destroyed, the rest of the building undamaged; part of the important façade of the Palazzo del Senato is in danger of collapse. The Loggia dei Mercanti is a wreck internally but the lower part of Giorgio da Sebenico's façade still stands, saved by protective

* Received for publication from the Archæological Adviser of the War Office.

masonry. Vanvitelli's Lazaretto has suffered a great deal of superficial damage but is perhaps not seriously ruined. The Museum and picture gallery in the church and Cloister of S. Francesco sustained several direct hits; most of the pictures had been removed but of the archæological collections one half was stored in the cellars and the rest left *in situ*. The communal library is buried under a mass of fallen masonry.

These are only the most important of Ancona's monuments and a number of lesser works have perished or been seriously damaged. The Roman amphitheatre, the Arco Clementino, the Porta Pia and the Fontana Calama are signalled as being the few minor monuments that have escaped injury altogether; the 11th century Church of Sta Maria in Porto Nuevo, six miles away from the city, which is one of the best examples of Romanesque work in the Province, was fortunately untouched.

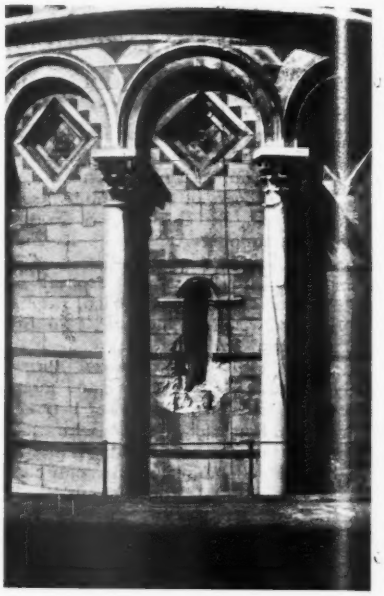
After Ancona, the Le Marche town to suffer most severely was Fano. Under the pretext of creating road blocks the Germans mined and destroyed the bell-towers of five churches and of the Palazzo della Regione; in only two cases could a real obstruction have been caused, and even there the mining was so clumsily done that most of the masonry of the towers fell inwards on to the churches and did not effectively block the roads. Of the Duomo the campanile, crossing and north transept were destroyed and the easternmost chapel on the north site was filled with rubble; its 13th century façade, the Nolfi chapel with Domenichino's frescoes, Carracci's altar piece and the stone pulpit are all undamaged. In S. Agostino the apse and south chapel were destroyed by the fall of the tower—Guercino's painting had been removed previously. In S. Domenico, a 14th century church, the dome, the apse and the high altar were destroyed; Ottaviano Nelli's St. Agnes and other paintings and frescoes are intact. In Sta Maria Novella the collapse of the campanile tore away the entire apse and badly shook the rest of the building; the Perugino paintings had been removed to safety. In S. Paterniano the apse was destroyed by the fall of Sansovino's tower; S. Michele, having no campanile, was undamaged, as was S. Francesco. In the Palazzo della Regione



Loreto: The nave roof under repair.

(built in 1289), Vanvitelli's tower, now lying in a heap in the Piazza, tore away the whole of the 4th bay of the arcaded façade; the interior is badly damaged. Apart from this the city suffered little hurt.

Loreto was bombed on the night of 5-6 July by the Germans, who concentrated eight waves of bombers in a deliberate attack on the Sanctuary: no Allied troops were quartered there. The dome was fired by incendiaries but most of the high-explosive bombs achieved no more than near misses; one exploded in the drum at the base of the cupola, which was not wrecked; the roof of the dome was burnt but the masonry survived; the nave roof was severely damaged by blast and by bomb fragments and the westernmost bay badly cracked. Considering the



Pisa: The Campanile; the only damage caused by Allied artillery.

violence of the attack the damage was miraculously little; the Casa Santa is absolutely intact and even the (19th century) interior decoration of the dome suffered only slightly.

Abbazia di Chiaravalle. Built in 1172, this is one of the earliest Gothic churches in the province. There is some danger to the roof and cracks in the vaults of five bays of the nave and south aisle; three bays of the cloister were destroyed. Repairs are in progress.

Fabriano. Most of the buildings were unharmed. The Ospedale del buon Cesu, with its fine brick and stone loggia of 1461, lost its entire central bay; the Bishop's palace had a shell-hole through the front wall of the top floor; otherwise the listed monuments are intact.

Fossombrone. The town was seriously damaged. The Roman bridge was destroyed. The Palazzo delle Scuole (containing museum and library) was about half destroyed. Damage to the Cathedral (containing Domenico Rosselli's altar-relief), to S. Francesco and to the 15th century castle of Rocca Mala testiana is said to be only slight.

At Gradara the Castello suffered from shell fire, but the damage can easily be made good. The Palazzo Comunale at Monte San Vito received some shell hits and is now being repaired. The Palazzo municipale at Offagna was severely damaged, but the main loss is in the archives which were housed there. At Osimo the roof of the Duomo suffered from shell hits but the interior of the building, its walls and the sculptured 13th century portal are virtually unharmed, and the same is true of the Palazzo Municipale. Bartolomeo Vivarini's altar-piece had been removed for safety; the collection of Roman sculpture is intact.

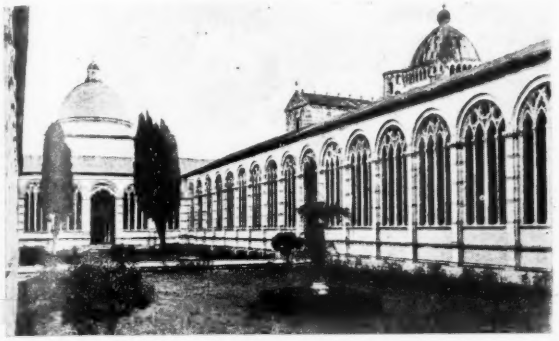
At Pesaro the Cathedral suffered little hurt, showing only a slight scar on the façade, but the roof was somewhat shaken by blast. The 14th century portal of the church of S. Domenico is intact; of S. Agostino and S. Francesco, both with fine Gothic portals, the former had its roof shaken by blast but is not seriously damaged, the latter received a direct hit which destroyed the roof and the top of the west façade but spared the portal. The town as a whole suffered much, but the Ducal Palace (the Prefettura) built for the Sforza family in 1461, is intact, the Atheneo, with its fine library, has only moderate damage to the roof, and the Palazzo Mosca was almost unharmed.

The recent reports deal with seven more centres in the province

of Umbria. Among the unharmed are Spello, with its late Renaissance Cathedral containing frescoes by Pinturicchio and the great marble tabernacle of Rocco da Vicenza, S. Andrea, also containing Pinturiccino's work, two other fine churches, an important museum and its Roman arch, walls and gates; Montefalco, which has four churches unusually rich in frescoes by Benozzo Gozzoli, Bernardino da Foligno. Tiberio d'Assisi, Perugino, Melanzio and others; Fontignano and Cerqueto, where two bombs fell close to the church but did no damage to the building or to Perugino's fresco of Saint Sebastian.

Corciano suffered only superficial damage. The church of Sta Maria lost some of its tiling, but Perugino's Assumption and Benfigli's gonfalone are intact; minor repairs are needed for the masonry of the Campanile. At Magione the Castle of the Knights of Malta was damaged by shell fire, but is structurally sound, and repairs are in progress. Todi lost only the window glass of Sta. Maria della Consolazione, the 16th century pilgrimage church opposite the town gate.

In Tuscania fighting has been severe. Pisa suffered severely—



the part of the town south of the river is a scene of utter devastation; on the north side the buildings along the river front are in ruins, but farther north the damage is not great.

Of the monuments south of the river, the little church of Sta Maria della Spina stands, as by a miracle, almost untouched. The façade of S. Paolo Ripa d'Arno is intact, but the body of the church is terribly ruined. S. Sepolchro, S. Martino and the Logge dei Banchi were hit but received only minor damage; the Orologio palace has been half destroyed. The Palazzo Comunale has lost some of its roof and there are cracks in the river wall, but its interior decoration is unhurt.

North of the river the Leaning Tower received one shell hit but is not seriously damaged. The Baptistry had one column, near the top, broken away. The Duomo has two holes in the roof, the windows are mostly broken (all the best glass had been removed), but otherwise damage is limited to the capital of one column high up on the façade. The serious damage was to the Campo Santo; the whole of the roof was burnt; the falling beams and a torrent of molten lead from the roof damaged some of the sculptures and many of the frescoes. The Triumph of Death and the three associated panels attributed to Francesco da Traini in the south portico have suffered little material damage beyond a certain discoloration; the Assumption over the main south door is completely destroyed; the other frescoes on the south wall are but little hurt except that the much-defaced lower register which had been transferred to canvas is completely destroyed. In the East portico almost the only damage is to the already much mutilated central panels. In the North portico the Benozzo Gozzoli frescoes, already much faded, are in a bad state and parts of them may be beyond salvaging; the heat has blistered the surface which peels away. The Universe fresco is virtually intact and the (less important) frescoes of the West portico are little damaged. The roof is now being repaired with the help of the R.E. and the Italian authorities are busy with measures of repairs for the paintings. Under the Benozzo Gozzoli frescoes have been found an important series of earlier monochrome drawings.

Of the other monuments of Pisa, S. Sisto was hit but not badly and the façade is intact; Sta. Caterina had one hole in the roof; S. Frediano has its façade intact but the roof has been holed four times, and there is one hole in the Campanile. S. Stefano was damaged by the fall of some masonry of the campanile; the late Renaissance ceiling in gilded and painted wood suffered severely and two chapel roofs are in bad condition. S. Nicola had one hole in the roof and some small shrapnel pitting of the façade and walls. The whole roof of S. Michele collapsed, except the part over the High Altar; the façade was not damaged. S. Francesco had one hole in the roof, easily repairable. S. Sepolchro was hit but not seriously. Of the great Palazzi, the Ugolino, the Giornata, the Agoştini, the Toscanelli and the Carovana are all undamaged; the Royal Palace has been wrecked internally, and the Medici palace is in part ruined; the University received several hits, but the library is intact, as is the Campano tower. The Ponte di Mezzo was damaged and all the other bridges blown up.

In Pistoia the Cathedral was but little damaged, only one cupola of the roof being removed by a shell. Of the important churches, S. Andrea, S. Bartolomeo in Pantano and S. Francesco at Prato are intact, Sta. Maria delle Grazzie only pitted by shrapnel and S. Paolo lost one window. S. Domenico was badly bombed, the whole of the west end being destroyed, together with part of the cloisters, and the frescoes are exposed to the open sky. S. Giovanni Fuoricivitas has lost the whole of its roof, but the pulpit by Fra Guglielmo da Pisa (A.D. 1270) is safe, and the Campanile is intact. S. Giovanni Battista was destroyed altogether. Of other buildings, the Ospedale del Cappo is unharmed (the Della Robbia work on the outside had been protected by walling), the Palazzo Pretorio and the Palazzo del Comune suffered only minor damage.

Lucca escaped lightly with slight damage to the Cathedral, to the church of Sta. Maria Forisportam and to the Palazzo del Governo; all its 18 other monuments are safe. Prato escaped damage altogether.

San Miniato suffered a good deal. The Duomo was twice hit by shells and was apparently mined by the Germans as an act of reprisal against the people, who had been ordered to collect in the building as a refuge during a battle; the façade and the campanile appear to be untouched, but the roof is down or damaged and the frescoes have been pitted with shrapnel. S. Francesco and S. Domenico both have roof damage, serious in the case of the former, but the latter came off lightly and its good paintings and altar in the style of Mino da Fiesole are safe. Half of the Grifoni palace has gone; in the remaining half,

Above—Pisa: The Camposanto

Pistoia: The Cathedral

fortunately intact, was a deposit of pictures from Livorno, MSS. and books, all unharmed. The mediæval tower, the Recca, was blown up by the Germans.

Taking next the smaller art centres in Tuscany, at Antella the parish church of Sta Maria with its fine Romanesque triumphal arch and the oratory of Sta. Caterina, with the series of frescoes by Spinello Aretino illustrating the life of the saint, are both untouched.

At Badia a Settimo the Germans blew up the 13th century campanile of S. Salvatore and the great Columbaione gateway tower with the Gothic relief of Christ adored by Cistercians: later they shelled the place and destroyed part of the cloisters. The roof and much of the wall of the north aisle has gone and the nave roof is badly holed, but the widely-decorated 14th century ceiling survives, as do most of the frescoes. At Bibbiena the church of S. Lorenzo was hit several times by shells and its roof holed, but the two great Della Robbia reliefs (one by Luca) are intact. The Palazzo Dovizi had only roof damage, at Camaiore the Confraternita del SS. Sacramento was untouched and its famous tapestry is safe.

The town of Castel Fiorentino suffered heavily, but its two outstanding monuments were spared; S. Francesco had only one small hole in its roof; the chapel of the Visitation with frescoes attributed to Benozzo Gozzoli is absolutely intact. Certaldo was badly shelled but here again the monuments suffered relatively little; there was minor damage to the roof of the church of S.S. Michele e Iacopo (whose sacristy was sacked) and the house of Boccaccio was badly damaged, but not irreparably; the magnificent Palazzo Pretorio, with its exterior decoration of shields and coats of arms in stone and glazed terracotta, is intact. The Villa Garzoni at Collodi was plundered by the Germans but not materially injured. Empoli is ruined. The great Collegiate church is a hopeless wreck, its Romanesque façade still complete but the Baptistry buried beneath the ruins of the campanile and the body of the church gone. S. Agostino, too, had its campanile blown up by the Germans and the apse was destroyed by the fall of the tower; the recently discovered frescoes by Masolino and Starnina are intact but require protection. All the pictures from these churches and the museum had been removed to deposits and are safe.

At Fiesole the damage was slight. The Duomo had its roof holed, as had S. Domenico, but in the latter church the Fra Angelico altar-piece and fresco are intact and so is the Pocetti chapel; damage to the Badia Fiesdana was confined to the roof and the interior is unhurt; the loggia façade facing Florence was not harmed (though the roof needs attention) and the fresco by Giovanni da San Giovanni did not suffer at all. At L'Impruneta the church of Sta Maria has suffered beyond repair; the roof has gone, the south wall is ready to collapse and the lateral chapels are badly smashed. The Michelozzo frieze, the triptych by Pietro Nelli and Tommaso del Mazza, the della Robbia relief in the North chapel and the tomb of Bp. Antonio deli Agli are ruined.

At Lastra a Signa the little church of S. Martino a Gangalandi is intact. Its fine 14th century singing gallery, its splendid apse by Alberti and its numerous frescoes by Bicci di Lorenzo are all safe. At Marlia the villa Reale was partly plundered by the Germans, but the fabric and the 17th century formal gardens are unspoiled. Montecatini suffered hardly at all and its important archives are in good order. At Montevarchi the church of the Collegiata had its roof slightly damaged but the Della Robbia reliefs were not affected. At Pescia there was only slight roof damage to the church of S. Francesco (the Berlinghieri picture of the saint and the frescoes are intact) and to the Palazzo Galeotti which has the civic museum and library. At Pietrasanta the Cathedral received slight damage, mainly to the roof, but S. Agostino, a 14th century foundation, and the Fortress were untouched. At Poggibonsi the damage was relatively slight. At Poppi the magnificent Palazzo Pretorio is intact; in the fine 14th century church of S. Fedele two shell-holes in the roof were letting in the rain on some of the pictures, but these were to be removed to safety. At San Casciano the church of the Misericordia is partly unroofed, but the pulpit by Giovanni di Balduccio, the Simone Martini crucifix and the three pictures by Ugolino Lorenzetti are all safe. The Collegiata is considerably damaged, but its best picture, an Annunciation by Fra Paolo da Pistoia, is unharmed. At San Giovanni Val d'Arno the choir of Sta Maria delle Grazie, rebuilt in the 18th century, is destroyed to its foundations: the 16th century nave and Vasari's magnificent altar are almost intact; the della Robbia lunette was damaged but can be mended. S. Lorenzo had its roof badly damaged, exposing the frescoes to the weather.

The mountain village of San Godenzo had been obliterated, but the primitive Romanesque abbey church, standing outside it, had no more damage than a few shell-holes in the roof. On the other hand the wooden statue by Baccio d'Agnolo and a 14th century polyptych on loan from Florence have disappeared. At San Piero a Grado the unique Romanesque basilica of the 11th-12th century was damaged by the German demolition of its campanile which they had used as an observation-post and wished to deny to the Allies; the N.W. corner of the building is shattered. Fortunately the frescoes by Deodato Orlandi (A.D. 1300) were undamaged and only need protection against the weather. At San Sepolchro the duomo had only a few small holes in the roof of the south aisle and the other churches were intact, as was the Palazzo Comunale, containing della Francesca's masterpiece, the Resurrection (his triptych, together with other important pictures, had been removed) and della Robbia reliefs; the other palazzi are in good condition, but the Torre Berta was demolished by German mines. At Serravezza the Palazzo Mediceo is intact, as is the Abbey at Vallombrosa. In the republic of San Marino there was no damage.

In the province of Emilia, the Collegiata church of Santarcangelo di Romagna had three shell-holes in its roof; the Palazzo Comunale was badly damaged, but the library and museum did not suffer greatly; the castle (Rocca Malatestiana) was severely hit on its north face but is easily repairable. At Verrucchio the Rocca Malatestiana castle is intact, the Palazzo Comunale was hard hit, but the collection of pictures though in some disorder was not destroyed; some objects from the Museum were stolen by the Germans. Rimini was a key point in the German line and paid the penalty: damage to its monuments has been very severe. The Arco d'Augusto was shaken by blast but still stands: it will require tracing. The Ponte d'Augusto, the Tempietto di S. Antonio, the Torre del Orologio, the statue of Paul V are intact. The Tempio Malatestiano (the cathedral), Rimini's most famous building, is very badly damaged—a direct hit destroyed most of the south end, the roof covering is gone, all the walls are shaken and cracked. The six main chapels, one containing Agostino di Duccio's masterpiece and one with Agostino's reliefs are standing, though damaged; the chapel of the Relics with Piero della Francesca's fresco containing the portrait of Sigismondo Malatesta is intact. The Romanesque church of S. Agostino was only slightly scarred by shell fragments; its 14th century frescoes have not suffered and its campanile is still standing. S. Girolamo is ruined—the whole upper church has fallen into the basement; S. Giuliano was damaged, but the Veronese picture and the polyptych by Bitino da Faenza had been removed previously. The Chiesa dei Servi is somewhat shaken but not dangerously so. The Palazzo del Podesta has some internal breakage but it is structurally sound; the same is the case with the Palazzo Comunale: the 13th century brick building has suffered only internally, but the adjoining stone building, the Palazzo Garampi, is half demolished. Of the Palazzo Lettimi the northern half is destroyed: the Castello Sigismondo has some damage to walls and roof but is structurally intact. The main contents of the picture-gallery and museum had been removed for safety long before the fighting drew near to Rimini; the Biblioteca Giambalunga remained *in situ*; the building was not severely damaged and the books are in good order. Outside the city, in the Via Flaminia, the church of Sta Maria della Colonnella was reduced to ruins.

BOOK NOTES

BATH

Bath. By R. A. L. Smith. 8vo. pp. 118. illus. Batsford. 1944. 12s. 6d.

REVIEWED BY MOWBRAY A. GREEN, R.W.A. [*F.*]

The author of this book, who was only 28 years of age when he died in April of last year, writes with a great deal of affection for the old city, and particularly so in the parts which deal with its ecclesiastical history. He arrives for the first time, as he says in his foreword, at the end of a hot summer's day, but, tired and footsore as he is, he loses nothing of its charm as the view of the city bursts upon him. He has divided his history into six periods—Roman Bath, Mediaeval Bath, Tudor and Stuart Bath, and the Bath of Beau Nash, of Smollett and Sheridan and of Jane Austen, but he has avoided a break-off between the periods, and has managed to show how one age led on into another. He has presented his readers with facts, but he has clothed them with a living interest, and even through the mists of time has woven together what might otherwise seem to be dry and nebulous history into realities which still appeal to us. This feature of his book makes it particularly interesting, and the story of Bath, with one exception—the period of its passing almost out of history from 400 to 577 A.D.—forms a complete and undivided account from pre-Roman times to the beginning of the Victorian period—from King Bladud to William Beckford. He points out that Bath in the Roman period was not a great and famous city with large civic buildings, but a small walled town enriched by the temple of Sul Minerva, and really getting its world-wide fame from the waters and from the wonderful buildings which enclosed them. In 577 the Anglo-Saxon conquest took place, and about this time Christianity was introduced into Bath, and for the six centuries following Bath became a monastic borough. With the Norman conquest, the city was plundered, but under John of Tours, the Abbey, which had been destroyed, was rebuilt again on a much larger scale. The author gives a detailed account of the feud between Bath and Wells as to the bishopric, of the neglect and ruin of the Abbey, and of its subsequent restoration under Bishop Oliver King and later Bishop Montagu. The account of the Abbey vaulting leads one to infer that it is all mediaeval, but the only original mediaeval parts are those over the Choir and its aisles, and over the North Transept, although it was undoubtedly the intention of Bishop Oliver King to finish the vaulting throughout the church as at present. A small piece of Bishop Montagu's original timber and plaster roof can be seen at the top of the illustration in Plate 8 just below the apex of the nave arch, and more clearly still in Plate 9. The baths and the rounds of pleasure in the days of Beau Nash, Smollett, Sheridan, and Jane Austen, are well described, and the author shows how successful Nash was in his insistence upon public entertainment as opposed to the " private assemblies and parties without number," which were introduced after his death. The account of the beginnings and completion of the eighteenth century renaissance architecture is set out in a very interesting way, especially as seen by the eye of one who was not a resident, but one wonders a little at the want of appreciation of the Circus. Could he have seen it without the plane trees, he might have thought differently, and we know from the second edition of John Wood's *History of Bath* what Wood himself thought of great trees being allowed to grow up in the open squares and spaces. The author is in error in stating that Pulteney Bridge was built by local architects. It was definitely the work of Robert Adam, and indeed his only work in Bath, although he prepared numerous schemes for the lay-out of the Pulteney Estate, which are preserved in the Soane Museum, Lincoln's Inn Fields. Indeed, Pulteney Street is built on the lines laid down by him. It is a pity that the author thought fit to pillory the Countess of Huntingdon and those who worked with her, because there is no doubt that Whitefield and the Wesleys did much to arouse the Church of England from the lethargy into which it had fallen in the latter part of the eighteenth century. The illustrations are excellent.

SOME RECENT TECHNICAL PUBLICATIONS

Building Standards for Building Materials and Components. B.S. Handbook No. 3. 8vo. iv. + 317 pp. London: British Standards Inst. 1944. 12s. 6d.

REVIEWED BY W. A. FORSYTH [*F.*]

The British Standards Institution has recently issued a most useful Handbook containing a summary of standard specifications relating to building materials and components. It is published with the object of supplementing the Housing Manual of the Government and as having a bearing upon War Emergency conditions.

The contents deals with materials primarily and not with design or construction. All sections are based upon 164 specifications which have been compiled by the Institution.

This detailed information upon constructional materials may be obtained in the various subjects at a small cost upon application to the B.S.I. The Handbook indicates clearly the purposes to which the materials are usually applied.

Although this valuable and comprehensive work has been compiled to meet immediate general requirements, it is not claimed to be complete. It is indeed the intention of the Institution to issue supplements from time to time. Selections from sixty additional specifications will be included in a supplement shortly to be issued. There is therefore much " in preparation." Loose leaf selections from the numerous subjects will be of increased advantage.

The influence of the R.I.B.A. representatives on the B.S.I. Committees has contributed to the practical value of much of the contents of the Handbook.

In such a publication it would be impossible to include all details covering the work of the architect, builder or engineer, for the circumstances governing each structure must inevitably vary in character, but the technical information which is extracted from authoritative specifications, although originally compiled for other purposes and now issued in the Handbook, will be found to possess great practical value.

Some observations, however, upon missing references may not be out of place.

In concrete aggregates, for instance, the important use of broken brick is omitted ; it possesses by its absorbent nature great advantages, and not only is weight reduced but it is fire-resisting. It also has definite acoustic value. Materials for plaster work are dealt with, but nothing is indicated for the composition of mortars.

Design is avoided throughout the Handbook, but illustrations are given of various casement windows to which facts concerning the sight sizes are added ; there are no similar particulars of double hung sashes. Framed, ledged and braced external doors, which may yet be included in war-time emergency, are not standardised. Panelled doors are deemed to require no muntins.

Some subjects are perhaps disproportionate in their references. The section on iron drains, for instance, is extensive in its repetition of illustrations of multiple cast-iron manholes and traps.

Terra cotta, glazed or unglazed, is doubtless excluded as being outside war-time emergency. The weights of lead sheets are given but those of copper are omitted. The standardised diameter of a 6 in. outlet to chimney pots on 9 in. by 9 in. flues is a frequent cause of trouble from solid fuel.

All these references, varying in importance, indicate the comprehensive value of the Handbook which should be included in every architect's library for quick reference to current information. Any further issue will probably have a " page " index for convenience as the indexing of the standard numbers only—compiled at intervals of time and subject—is not sufficiently clear.

The Handbook is published at 12s. 6d., and the pending supplements at 7s. 6d. each.

For the convenience of members who wish to obtain a copy of the Handbook an order form is enclosed with this number of the Journal.

Sound Insulation and Acoustics. Post-War Building Study No. 14. By The Acoustics Committee of the Building Research Board of the Department of Scientific and Industrial Research. London. 1944. Published for the Ministry of Works by His Majesty's Stationery Office. 1s. net.

This publication is particularly valuable for two reasons : first as a summary of modern knowledge of sound insulation and acoustics and secondly as a concise and simple introduction to the subject, for those who have not had, or taken advantage of, previous training.

It is said to be a rule in warfare that no weapon can be safely abandoned as obsolete until a new one has been proved to be capable of fulfilling all the functions of the old and also of extending them. We

have an enthusiastic tendency in building to adopt new materials and methods of construction with rather less caution than this and one result is that although "Buildings are better heated and lighted than they were years ago, and there is better protection from such troubles as dampness, they are noisier now." The chief reasons for this are that sound sources have increased in number and kind, and therefore in nuisance value, while, on the other hand, "The trend of modern construction is towards a greater continuity, lightness and engineering efficiency, which leads to easier transmission of sound." In fact we tend to abandon the traditional without pausing to consider all the shortcomings of the new, or being satisfied that we know how these shortcomings can be removed.

The first part of the report deals with sound sources and sound insulation, i.e., the methods of reducing unwanted sound, or "Noise." It is emphasised throughout that the importance of designing against noise begins with the town planner, for it is his responsibility to ensure that domestic buildings and other places where quiet is required are sited away from places where noise is inevitable. It is, of course, desirable that noise sources should be reduced as much as possible, but it is unlikely that this will be achieved in our generation and in the case of school playing grounds, for example, it is not necessarily advisable.

The next step is site planning, which involves "the segregation of the noisy and quiet parts of the buildings on the site," and the last step is the design of the structure and finishes and the selection of suitable equipment. It is important, therefore, that town planners and architects should be more aware of the problem before they set to work and be reminded that "Nothing than can be added readily to a building after it is erected can have more than a limited effect on the insulation."

Cost should not be a deterrent. The Committee report that some of the most important of their proposals for structural insulation have already been tried and found to involve little or no extra cost and they confidently predict that as the others are tried and become familiar, they, too, will be reasonable, "especially if planning is also allowed to play an effective part in design for quiet."

The second part of the report deals with the acoustics of auditoria, where the aim is to provide good hearing conditions for speech or music by controlling reverberation and loudness over a range of sound frequencies. The factors which govern these conditions are well understood and clearly explained. Information is brought up-to-date with recommendations for the treatment of various types of auditoria, and here again the job begins with the planner. A hall of the wrong shape cannot be "corrected" by any mystic use of wires or draperies applied afterwards.

The report concludes with proposals for future research and a summary of the Committee's recommendations. There are six appendices on which special points are discussed.

A GREAT AMERICAN LABORATORY

Convenience for Research: buildings for the Bell Telephone Laboratory, Inc. . . . described by Don Graf. la. 4to. 56 pp. New York. 1944. Voorhees, Walker, Foley and Smith. Limited and privately circulated edn.

New Buildings of B—T—L—Murray Hill, N. Jersey. A description of structural features and facilities by Franklin Hunt. Jnl. of Applied Physics. Vol. 14. pp. 249-57. 1943. June.

Power Distribution for Murray Hill Buildings, by C. T. Siebs. Bell Laboratories Record. 1944. February. pp. 273-281.

Partition Flexibility at Murray Hill, by J. G. Motley. Bell Laboratories Record. 1942. September. pp. 6-14.

Murray Hill Unit, B—T—L—Inc., by Don Graf. Pencil Points. 1942. August. pp. 35-70.

The Bell Telephone Company new laboratories at Murray Hill, New York, are among the finest, possibly the finest, industrial laboratory buildings in the world. Through the kindness of Mr. Ralph Walker, A.I.A., of the firm of Voorhees, Walker, Foley & Smith, architects of the building, the Library has received a number of tear-out sheets of articles in American architectural and scientific journals and the magnificent privately published monograph "Convenience for Research."

Allowing for the inevitable reluctance of any industrial research body to show all it knows or has, we now have in these publications as complete a presentation as has yet been published of any great laboratory.

The whole laboratory is planned on a 6ft. bay; the multitude of services are all ducted so that they can be tapped at regular intervals making possible almost unlimited variations in partitioning. This whole 6ft. modular unit was built and tested full scale and later intensive studies were made to organise the combination of the units with related office units—the latter on an 8ft. unit—making T-shaped major units, of which there are six.

Among the most important sections is the acoustics laboratory with a theatre seating about 350.

Convenience for Research is beautifully printed by the Aldus Press and is illustrated with many large photographs.

CONSTRUCTION TEXT BOOKS

Building Construction. Vols. 2 and 3. W. B. McKay. Obl. fo. 136 and 148 pp. Longmans, Green. 1944. 9s. each vol.

Roofing. By J. Lee. Teach Yourself Building Series. Sm. 8vo. 154 pp. Hodder and Stoughton for English Universities Press. 1944. 3s.

Constructional Details. By D. E. Warland. Teach Yourself Building Series. Sm. 8vo. 204 pp. Hodder and Stoughton for English Universities Press. 1944. 3s.

Building Illustrated. By W. H. Smith. 4to. 112 pp. Spon. 1944. 16s. 6d.

REVIEWED BY DENZIL NIELD [*A.*]

Looking at a technical bookstall one cannot help wondering about the value of the large number of building handbooks available. They are not particularly cheap, nor are they thorough or comprehensive, one or two "snippets" of information may be useful, but the construction shown is mostly obsolete. In a hundred pages or so they range from the basic principles down to useful hints for the householder On the other hand, apparently not enough paper is allocated to the few books on construction that are good, as they seem always to be out of print; common sense would suggest that many of the handbooks could well give place to a larger supply of the latter.

Technical books will have an enormous influence on the standard of building construction in the next few years, when so many persons with little training will be absorbed into the industry.

A series that should be widely available is that by Mr. McKay, of which volumes 2 and 3 have just been published. These volumes keep up the standard of his first volume produced some years ago, and which has been found by far the best textbook on building construction yet, certainly for school use, if not for reference. Volumes 2 and 3 together cover what is usually accepted as Second Year work in schools of Architecture and Building. Volume 2 includes advanced brickwork, including reinforced brickwork, house drainage, more advanced masonry, small steel roof trusses. Volume 3 deals with more advanced carpentry, partitions, discontinuous construction for sound proofing, framing of larger roofs, trusses including laminated trusses, more advanced joinery, including reasonable use of plywood and blockboard, staircases and pitched roof coverings. Great attention is paid throughout to materials, their manufacture and their properties. the drawings are large and clear, even if the sheets are bewilderingly full at times; the section on masonry and joinery are very comprehensive, with examples of much better design than usual.

Until the teaching of construction to architectural students is reorientated to emphasise constructional design, with the student encouraged to build up his own construction from first principles (no easy change), while in fact we adhere to the simple illustrative approach, this series by Mr. McKay will be very valuable.

Roofing by J. Lee, and *Constructional Details*, by D. E. Warland, in the Teach Yourself Building Series, are above the usual run of small handbooks. In *Roofing* there is a surprising concentration of information considering it covers from roofing a roman villa to bomb repairs, but it is more suitable for the operative than the architect.

Constructional Details seems to be a miniature building construction book touching on most things (plumbing is dealt with in six pages),

including the construction in detail of a garage, complete with the quantities taken off for it. Altogether the know-all for the misled demobilised soldier with dreams of starting as a small builder.

Building Illustrated, by W. H. Smith, is another book trying to cover too large a field; too much of the construction shown is obsolete, the drawing on the jacket shows a section of a wall not complying with the Model Bylaws in one respect, nor with the London Bylaws in another.

One cannot help feeling that even the operative would be wise to save his cash (and he would not have to save much more) and buy the three volumes by Mr. McKay, he would find in them a solid basis of sound knowledge.

SCHOOL STANDARDS

Regulations Prescribing Standards for School Premises, 1944. Draft S.R. & O. 1944, No. — . H.M.S.O. 8vo. 24 pp. 6d.

DRAFT BUILDING REGULATIONS. Circular 10. H.M.S.O. 8vo. 4 pp.

MEMORANDUM ON THE DRAFT BUILDING REGULATIONS proposed to be made under Section 10 of the Education Act, 1944. H.M.S.O. 8vo. 24 pp. 6d.

Draft Building Regulations made under the Education Act, 1944, laying down both general standards common to all Primary and Secondary Schools and prescribing particular standards of accommodation for different types of schools have been published by the Ministry of Education.

The standards specified are applicable to both existing and new schools and cover County and Voluntary Schools, Nursery Schools and Classes, Special Schools and Boarding accommodation. They are framed on the basis of an ultimate school-leaving age of 16, but, while plans should be drawn on this basis, it is not contemplated—particularly in view of the building situation after the war—that the projected construction should in all respects be completed for the extra age group over 15 in the immediate future. Special attention is drawn to the possibility of prefabricated construction.

The Building Regulations will come into force on 1 April next. The order and the period of time in which compliance with the standards will be secured in any particular school will be proposed in the Local Authority's Development Plan and will be governed by the directions given by the Minister for carrying out the plan.

In selecting sites for new schools attention is to be given to the importance of avoiding sites abutting on main traffic routes and of ensuring that children do not have to cross such routes on their way to school. The importance of unrestricted sunlight, avoiding undue exposure to prevailing winds, and the value of trees and other features are also stressed.

Detailed standards are laid down for lighting, heating, ventilation, hot and cold water supply, sanitation, drainage and sewage disposal, floor loading and the planning of staircases and corridors. All types of school must have staff rooms, accommodation for medical inspection and treatment, drying facilities and adequate storage provision. Requirements for cloakrooms, washing and sanitary accommodation are defined for the various types of school, and adequate kitchen accommodation must be provided in day as well as boarding schools for the preparation and serving of school meals. All schools, except the smaller Primary Schools, must have one or more separate dining-rooms accommodating at least 65 per cent. of the number of pupils in not more than two shifts.

Three Appendices to the Memorandum on the Regulations deal respectively with the planning and construction of schools, the suggested distribution of practical accommodation in secondary schools and kitchen and dining-room planning and equipment.

A reduction in the size of classes will take place progressively and as speedily as possible to a maximum of 40 in Primary and 30 in Secondary Schools. Up to the present the standard size of classes in public Elementary Schools has been 50 for Juniors and Infants and 40 for Seniors. To reduce both these figures by 10 will involve a large increase in the teaching staff and buildings, and for this reason a greater reduction is not regarded as immediately practicable.

The size of the site of every County and Voluntary School, including playground space, will vary from half an acre for the smallest Primary School to three acres for a three-form entry Secondary School. Playing-field accommodation must be provided in addition, ranging from half an acre for the smallest Primary Schools containing junior children to fourteen acres for large Secondary Schools. The site areas may need to be still larger where the curriculum includes gardening, the growing of fruit and vegetables, the keeping of live-stock or similar activities.

The regulations also deal in detail with requirements for nursery schools and special schools for handicapped children and with boarding school requirements.

Accessions to the Library

1944-45—I, *concluded*

Owing to the urgent need to economise space this list now records only new publications, excepting old publications having reference to current demands, e.g. on planning and topography. The others are summarised at end under "Older Works."

For economy of space the following also are now generally excluded from the list: (1) Year-books, lists of members, &c.; (2) extracts from periodicals, and reprints of periodical articles already noted in the* REVIEW OF PERIODICALS *; (3) Government leaflets of slight or transitory interest. Full particulars are available in the library.

Books presented by the publishers for review marked R.

Books purchased marked P.

**Books of which there is at least one copy in the Loan Library.*

BUILDING TYPES, *continued*

RELIGIOUS, *continued*

BRAKSPEAR (*Sir* HAROLD) 726.715 (42.38 B)
The Cathedral church of St. Peter and St. Paul at Bath now generally known as Bath Abbey.
6th ed. pam. 7¼″. Gloucester: British Pubg. Co. 1944. 1s. *Presented.*
With plan.

(EDUCATIONAL)

GREAT BRITAIN: PARLIAMENT—ACTS 727 : 34 (42)
Education Act, 1944. . . . to reform the law relating to education &c. (7 & 8 Geo. 6. Ch. 31.)
9¾″. Lond.: H.M.S.O. 1944. 2s. P.
727 : 374 + 725.835 + 725.822 : 72.092.4

ENGELHARDT (N. L.) *and* (N. L.), *junr.*
*Planning the community school. (Adult education series.)
8½″. xix + 188 pp. + (viii) pls. New York &c.: Amer. Book Co. [1940.] ($2.07.)
Presented by the American Library, Office of War Information, & P.

[ILLUMINATING ENGINEERING SOCIETY] Inf. file 727.1 : 696.93
Lighting reconstruction pamphlets:
No. 3. The Lighting of schools. General considerations &c.
pam. 8½″. Lond. [1943.] R.
× MS.

RALPH (STANLEY) 727.112.21 + 725.573
The Design and planning of nursery schools and crèches. (Thesis for Final Examination.)
typescript & *Repr. of D.* 1944.
Presented by the Author.
× MS.

LANDAW (DAVID) 727.112.222
The Design of young people's colleges. (Thesis for Final Examination, July.)
typescript, & *Repr.* of *D.* 12¾″. 1944.
Presented by the Author.
× MS.

HORSHAM (R. J. E.) 727.62
Zoo-architecture. A thesis on planning. (Thesis awarded distinction in Final Examination, July.)
typescript, *Ink & Col. D.* 12¾″. 1944.
Presented by the Author.

(DOMESTIC)

MINISTRY OF HEALTH Inf. file 728 [72.08 : 347.234.1] 623
Derequisitioning of War Department house property. (Circular 136/44.)
dupl. typescript. 8¾″ × 7″. 1944. R.
728.1 + 728.25 + 711.6

MINISTRY OF HEALTH *and* MINISTRY OF WORKS
*Housing manual 1944.
9½″. 103 pp. incl. pls. Lond.: H.M.S.O. 1944. 2s. R. & P. (5).

MARGOLD (STELLA K.) 728.1 (4/9 + 73)
Housing abroad up to World War II. Supplemented by comparisons with conditions in United States. (Massachusetts Institute of Technology: Dept. of Architecture.)
dupl. typescript, printed title-page. 11″ × 8½″. N.Y.: Wittenborn, for M.I.T. 1942. (17s. 6d.) P.

728.1 (73) box

U.S.: NATIONAL HOUSING AGENCY—OFFICE OF THE ADMINISTRATOR: DIVISION OF URBAN STUDIES

Bulletins:

728.1 (41/42—33 + 48 + 471)

No. 13. Notes on emerging postwar housing policies in certain other countries [British Empire, and Scandinavia and Finland].

dupl. typescript. 10½″. 1944. *Presented.*

MINISTRY OF HEALTH

Inf. file 728.1 (42)

Housing (Temporary Provisions) Act, 1944. (Circular 120/44.)

dupl. typescript. 7″. 1944. R.

Enclosing Housing, England (Provisional Rules and Orders), *&c.*

Inf. file 728.1 (42)

Housing, England. Form of orders and notices. The Housing Act (Form of Orders and Notices) Amendment Regulations, *&c.*

leaflet. 9¾″. Lond.: H.M.S.O. 1944. 1d. R.

728.1 (42)

R.I.B.A.: RECONSTRUCTION COMMITTEE—HOUSING GROUP

Housing. A report *&c.*

pam. 8½″. Lond. [1944.] 1s.

MINISTRY OF HEALTH

Inf. file 728.1 (42) [728.1 : 693.061

Factory-made houses. [Supply to local authorities.] (Circular 105/44.)

dupl. typescript. 8¾″. 1944. R.

Inf. file 728.1 (42) : 940.5344] 69.051.22

Advance preparation of housing sites. (Circular 74/44.) [Subsurface works, collaboration.]

leaflet. dupl. typescript. 8¾″. 1944. R. (2).

Inf. file 728.1 (42.1) + 728.1 : 693.061 ACN + S

London housing: winter plans 1944-45. (Circular 134/44.)

dupl. typescript. 13″. 1944. R.

Enclosing:

Temporary housing. Asbestos cement Nissen. Enclosure to . . . Circular *&c.*

T— h—. Seco construction. Enclosure *&c.*

2 dupl. typescripts. 13″. [1944.]

Temporary housing. Asbestos cement Nissen.—T— h—. Seco construction.

2 sheets of drawings, *Repr.* 15″ × 21″. [1944.]

JENKINSON (CHARLES) 728.1 (42.74 L)

Our housing objective. [Leeds.] (Design for Britain, second series, 23.)

pam. 8½″. Lond.: Dent. 1943. R.

728.1 (71) + 711.4 (71)

CANADA: ADVISORY COMMITTEE ON RECONSTRUCTION—[SUB-COMMITTEE] IV. HOUSING AND COMMUNITY PLANNING

*Final report *&c.*

9¾″. 339 pp. + folding pl. Ottawa. 1944.

Presented by the Committee (2).

728.1 (73) NHA. box

CRANE (JACOB) 728.1 (725)

Housing goes international. [Puerto Rico.] (*From* Boletin de la Comisión Panamericana de Cooperación Intermunicipal, Habana, v, 4, Apl.)

leaflet. 12″. 1944.

Workers' housing in Puerto Rico. (*From* International Labour Office, International Labour Review, xlix, 6, June.)

pam. 9¼″. Montreal. 1944. 6d.

Presented by the U.S. National Housing Agency.

728.1 (73) NHA. box

BLANDFORD (JOHN B.), *junr.* 728.1 (73)

Next steps in our housing program. ([National Housing Agency.])

dupl. typescript. 10½″. 1944.

Presented by the National Housing Agency.

Inf. file 728.1 (73) + 711.4—163 (73)

SURVEY GRAPHIC, *newspaper, New York*

——. [Special number:] Call of our cities—Redevelopment—Postwar housing. (xxxiii, 4. Apl.)

11¾″. New York, *&c.* 1944.

Presented by the U.S. Office of War Information.

ARCHITECTURAL REVIEW 728.1 (73) : 940.5

U.S. wartime housing. (*From* A— R—, August.)

14¼″. 32 pp. Cheam. 1944. R.

728.1 (73) box

728.1 (73) : 940.5344] 014.3 + 711.4—173 (73) : 940.5344] 014.3

U.S.: NATIONAL HOUSING AGENCY—OFFICE OF THE ADMINISTRATOR: DIVISION OF URBAN STUDIES

Abstracts of selected material on postwar housing and urban development, *cont.*

Group iii. (Dec. 1.)

dupl. typescript. 10½″. 1943.

Abstracts of selected material on postwar housing and urban development, *cont.*

Group v. (Mar.); Group vi. (May); Group vii (Sept. .

dupl. typescripts. 10½″. 1944.

WATKINS (W. P.) 728.1 : 334

Co-operative home building. (Design for Britain, second series, 21.)

pam. 8½″. Lond.: Dent. 1943. R.

BROWNE (REGINALD) 728.1 : 334.1

Housing societies. (Design for Britain, second series, 35.)

pam. 8½″. Lond.: Dent. 1944. R.

MINISTRY OF HEALTH

Inf. file 728.1 : 693.061 A + M + U

Factory made temporary houses. (Circular 131/44.) [Exhibition of M. of Works, Uni-Seco and Arcon types at Millbank.]

dupl. typescript. 8¾″ × 7″. 1944. R.

Inf. file 728.1 : 729.9 (064) (42.48 B

Housing equipment exhibition at Birmingham. (Circular 132/44.)

leaflet dupl. typescript. 7¼″. 1944.

Inf. file 728.1 : 729.9 (064) (42.48 B

[MINISTRY OF WORKS, MINISTRY OF HEALTH, *and* MINISTRY OF FUEL AND POWER]

Housing equipment. An exhibition of standard equipment for post-war houses *&c.* [Birmingham, 1944].

pam. 8¼″. n.p. [1944.] 2d. R.

and presented by Mr. C. Barman.

× MS.

WARING (ARNOLD S.) 728.1 : 940.5344

Post-war housing. (Thesis awarded distinction in R.I.B.A. Final Examination, July.)

typescript (embossed cover), *Ink D.* & *Repr.* 13″. 1944.

Presented by the Author.

728.1 (73) box

U.S.: NATIONAL HOUSING AGENCY—OFFICE OF THE ADMINISTRATOR: DIVISION OF URBAN STUDIES

Bulletins: 728.86 : 333.32 (4/9)

No. 12. Government measures applied in other countries to encourage private building of housing *&c.*

dupl. typescript. 10½″. 1944. *Presented.*

BALLANTYNE (ADIE) 728.933.1

*Choose your kitchen. A book for the housewife.

7½″. 84 pp. + pls. Lond.: Faber & Faber. 1944. 5s. R. & P. (2).

ALLIED ARTS

Inf. file 7 (076)

MINISTRY OF EDUCATION (*formerly*, to 1944, BOARD OF EDUCATION, *q.v.*)

Reorganisation of the Ministry's art examinations. (Circular 4.)

leaflet. 9¾″. 1944. R. (2).

BUILDING SCIENCE

GREENHALGH (R.), *editor* 69

The Practical builder. A . . . guide to the latest methods of modern building practice. [Articles by J. H. Bennetts and others.]

8¾″. 448 pp. Lond.: Odhams. [1944.] 9s. 6d. R.

AMERICAN STANDARDS ASSOCIATION Inf. file 69 (083.74) (73)

American standards. [Lists and index.] (4401.)

pam. 10¾″. New York. 1944. R.

STADDON (L. S.) *and* MCPHERSON (L.) 69] 5/6

*A First course in science for building students.

8½″. (iv) + 240 pp. Lond.: Univ. Tutorial Press. 1944. 5s. R. & P. (2).

BOSSOM (A. C.) 69 : 940.5344

Post-war building. (Design for Britain, second series, 27.)

pam. 8½″. Lond.: Dent. 1944. R.

Structural Elements

69 (083.74) (73) box

U.S.: Dept. of Commerce—National Bureau of Standards
69.022 : 694.55 : 691.338

BMS 97. Experimental dry-wall construction with fiber insulating board. C. G. Weber and R. C. Reichel. 1943. (10c.)
69.022.6 : 693.068.86 : 620.193

BMS 101. Strength and resistance to corrosion of ties for cavity walls. C. C. Fishburn. 1943. (10c.)
—Presented by the Bureau.

Faucounier ( ) Inf. file 69.023.6 : 693.55] 620.1
Breakdown test of a thin conoidal vault of reinforced concrete.—The covering of large rectangular areas by thin reinforced concrete-shell roofs. (*From* International Association of Bridge and Structural Engineering [Pubns.], Second vol., 1933-34, Zürich.)
English translation. Ministry of Home Security: R. & E. Dept. (Records), *trans.* Transn. No. 59.
typescript. 9½″ × 7½″. 1944. *Presented by the Ministry.*

U.S.: Department of Agriculture 69.023.7 : 694.636
Technical bulletins:
No. 691. The Glued laminated wood arch. By T. R. C. Wilson. (Oct.)
9¼″. 123 pp. Washington: Supt. of Docts. 1939. (20c.)
Presented.

British Standards Institution 69 (083.74)
B.s.—War emergency B.s.:
69.025.33 : 691.591
B.s. 1093. Pitch mastic flooring.
1944. 2s. R.
69.025.33 : 691.591
B.s. 1177. Pitch mastic flooring incorporating lake asphalt.
1944. 2. R.
69 (083.74) (73) box

U.S.: Dept. of Commerce—National Bureau of Standards
69.026.33
BMS 100. Relative slipperiness of floor and deck surfaces. P. A. Sigler. 1943. (10c.)

Structural Mechanics

Copper Development Association 69.043 : 691.73
*Some facts for architects and others . . . about Copper alloy extruded and drawn sections *&c.* (Pubn. No. 14.) (Copper alloy sections. *cover title.*)
3rd ed. 8½″ × 7¼″. 24 pp. incl. pls. Lond. 1939.
Presented by the Association (2).

Building Operations

69.05 (084.21)

Ministry of Works: Directorate of Labour Requirements and Plant
*Programme and progress. A pamphlet dealing with the preparation of charts for civil engineering and building contracts.
pam. 13¼″. 3 folding diags. Lond.: H.M.S.O. 1944. 9d. R.

British Standards Institution 69 (083.74)
69.057.63
B.s. War emergency B.s. 1129. Timber ladders.
1943. 2s. R.

Molloy (E.), *editor* 69.057.7
*Builders' machinery and equipment. *&c.* (Newnes' building practice series, 3.)
9″. viii + 128 pp. Lond.: Newnes. 1942. 7s. 6d.
Presented, & P.

Materials

U.S.: Department of Agriculture—Forest Service: Forest Products Laboratory, *Madison*
Inf. file 691.11 : 016 (73)
Partial list of governmental publications of interest to architects, builders, engineers, and retail lumbermen.
dupl. typescript (printed cover). 10¼″ × 8″. Madison. 1942.
Inf. file 691.11 : 620.1 + 694.1
List of publications on mechanical properties and structural uses of wood and wood products. (No. R 200.)
dupl. typescript (printed cover). 10¼″ × 8″. Madison. 1943.
Inf. file 691.11 : 620.197] 016 (73)
List of publications on wood preservation. (No. 704.)
dupl. typescript (printed cover). 10¼″ × 8″. Madison. 1943.
—Presented by Mr. F. C. Lancaster.

British Standards Institution 69 (083.74) boxes
B.s.:
691.11 [69.08 : 389
940: pt. 2. Grading rules for structural timber. For purposes where the stresses in timber are known.
8½″. 1942. 2s. P.
Inf. file 691.11 : 628.1 (42)

Ministry of Health + 696.12 (42)
Post-war reconstruction programme. Rural water supplies and sewerage. (Circular 119/44.)
leaflet. 9¾″. Lond. 1944. R.

British Standards Institution 69 (083.74)
691.11 [69.08 : 389
B.s. 1175. Sizes of stress-graded softwood timber.
1944. 2s. R.
Inf. file 691.116.5 : 016 (73)
+ 691.185 : 016 (73)

U.S.: Department of Agriculture—Forest Service: Forest Products Laboratory, *Madison*
List of publications on glue and plywood. (No. 513.)
dupl. typescript (printed cover). 10¼″ × 8″. Madison. [1942.]
Presented by Mr. F. C. Lancaster.

British Standards Institution 69 (083.74) boxes
War emergency B.s.:
691.155 : 691.161
989: Bitumen and fluxed pitch roofing felts.
1944. 2s.
69 (083.74) (73) box

U.S.: Dept. of Commerce—National Bureau of Standards
691.322 : 691.319
BMS 98. Physical properties of terrazzo aggregates. D. W. Kessler, A. Hockman and R. E. Anderson. 1943. (15c.)

British Standards Institution 69 (083.74)
B.s.—War emergency B.s.:
691.598 [697 : 643.3
B.s. 1176. Air drying black paint for cooking appliances.
1944. 2s. R.

Gloag (John), *editor* 691.6 + 693.56
*The Place of glass in building.
2nd ed. 7″. 92 pp. Lond.: Geo. Allen & Unwin. 1944. 7s. 6d. R.
To Loan Library.
1st ed. 1943 in Library.

Copper Development Association 691.73 : 696.11
*The Use of copper for domestic water services. (Pubn. No. 8.)
8th ed. 11¼″ × 8½″. (ii) + 52 pp. incl. pls. + 4 folding pls. Lond., &c. 1938.
Presented by the Association (2).
6th ed. 1935 in Library.

Copper Development Association 691.73 [696.6 : 621.315
*Copper for earthing. (Pubn. No. 30.)
Reprint. 8½″. 56 pp. Lond. 1938 (1943).
Presented by the Association (2).

Construction (including Prefabrication)

69 (083.74) (73) box

U.S.: Department of Commerce—National Bureau of Standards
Building materials and structures. Report *&c.*:
693 : 699.81
BMS 92. Fire-resistance classifications of building constructions. Report of Sub-Committee on F— - r— c— of the Central Housing Committee on Research, Design and Construction.
1942. (25c.)
693 : 699.82
BMS 94. Water permeability and weathering resistance of stucco-faced, gunite-faced, and "Knap Concrete-Unit" walls. C. C. Fishburn. 1942. (10c.)

D.S.I.R.: Building Research Station Inf. file 693.061 : 016
Library bibliographies:
No. 69 N. Prefabrication.
Suppt. No. 3. dupl. typescript. 13″. 1944. R.

Inf. file 693.2

BONNELL (D. G. R.), ALDRED (D. W.), *and* BALDWIN (L. W.)
Methods of bricklaying. (*From* The Builder, July 28.)
leaflet. 10″. 1944.
Presented by the Building Research Station.

U.S.: DEPT. OF COMMERCE —NATIONAL BUREAU OF STANDARDS
693.32 : 620.1
BMS 96. Properties of a porous concrete of cement and uniform-sized gravel. P. H. Petersen. 1943. (10c.)

Inf. file 694.1 T

TIMBER ENGINEERING COMPANY (*subsidiary of* NATIONAL LUMBER MANUFACTURERS' ASSOCIATION)
Chesapeake and Ohio Preframes and bores. All treated timber. (*From* Railway Engineering and Maintenance, Apl. 1937.) [Teco system.]
pam. 11½″. Washington. [1937 or later.]
Presented by Mr. F. C. Lancaster.

694.1 : 608.375] 940.5

U.S.: WAR PRODUCTION BOARD—CONSERVATION DIVISION
National emergency specifications for the design, fabrication and erection of stress grade lumber and its fastenings for buildings. Directive No. 29.
11″. 63 pp. Washington: Supt. of Docts. 1943. (15c.)
Presented by Mr. F. C. Lancaster.

694.1 : 949.5 binder

MINISTRY OF HEALTH 694.1 : 940.5
Economy in building construction. [Referring to M. of W.: Directorate of Bldg. Programmes (Constl. Design), Wartime timber economy No. 5.] (Circular No. 101/44.)
dupl. typescript. 7″. 1944. R.

69 (083.7) (73) box

U.S.: DEPT. OF COMMERCE—NATIONAL BUREAU OF STANDARDS
694.55 : 699.82
BMS 93. Accumulation of moisture in walls of frame construction during winter exposure. C. G. Weber and R. C. Reichel.
1942. (10c.)
694.636 : 69.023.947
BMS 99. Structural and heat-transfer properties of "Multiple box-girder plywood panels" *&c.* H. L. Whittemore and others.
1943. (15c.)

SANITARY SCIENCE AND EQUIPMENT

Inf. file 696.11 : 628.1 (42) + 696.12 (42)

NATIONAL FEDERATION OF WOMEN'S INSTITUTES
Water and sewerage supply. [Rural conditions, England and Wales; results of questionnaire.]
pam. 9¾″. Dorking. 1944.
Presented by the Federation.
(series) 72 : 940.5344

MINISTRY OF WORKS 696.6
*Post-war building studies:
*No. 11. Electrical installations. By a committee convened by the Institution of Electrical Engineers.
9¾″. 96 pp. Lond.: H.M.S.O. 1944. 1s. 6d. R. (3).

INSTITUTION OF ELECTRICAL ENGINEERS 696.6 : 34
Regulations for the electrical equipment of buildings.
Incorporating Recommended war emergency relaxations *&c.* (11th ed.).
11th ed. [further] revised. 7¼″. 5 + vi + 173 pp. Lond.: Instn., & Spon. 1943. 1s., 1s. 6d. R.
11th ed. (proper), 1939, already in Library.

[ILLUMINATING ENGINEERING SOCIETY] Inf. file 696.93
Lighting reconstruction pamphlets:
No. 1. Principles of good lighting. General considerations *&c.*
pam. 8½″. Lond. [1942.] R.

BRITISH STANDARDS INSTITUTION 69 (083.74) box
British standard code of practice: (Ministry of Works: Codes of Practice Committee *&c.*)
697 + 699.86
CP. : 1944. Code of functional requirements of buildings (classification code). Chap. viii. Heating and heat insulation. (Comprehensive scheme of codes of practice for building.)
Fifth proof CP (B) 309. Draft for comment subject to revision.
pam. 8¾″. + folding pl. Lond. 1944. R.

697 + 697 : 643.3 + 697.4] 728 : 94 .5344

WOMEN'S ADVISORY COMMITTEE ON SOLID FUEL
Heating, cooking and hot water supplies for the post-war house. A summary of the views *&c.*
9¾″. 31 pp. n.p. (The Committee, 4 Rickett St., S.W.6.) 1944. 1s. 3d. R.

MARGOLIS (A. E.) Inf. file 697.34 42.1
An Outline district-heating scheme for London. (*From* Engineering, May 26.)
leaflet. 14¼″. n.p. 1944.
Presented by the Author.

YOUNG (J. S. AUCKLAND *and* J. W.) Inf. file 697.83
Better post-war housing with the Benllech hearth.
pam. 11″. Manchester: the authors (The Croft, Meadow Rd., Urmston). [1944.] 1s.
Presented by the first Author. [*A.*].

PROOFING

69 (083.74) (73) box

U.S.: DEPT. OF COMMERCE—NATIONAL BUREAU OF STANDARDS
699.82 : 691.598] 69.022
BMS 95. Tests of cement-water paints and other water-proofings for unit-masonry walls. C. C. Fishburn and D. E. Parsons.
1943. (15c.)

(A.R.P., WAR DAMAGE)

AKADEMIIA KOMMUNAL'NOGO KHOZIAISTVA [ACADEMY OF MUNICIPAL ECONOMY] *&c., Moscow*
699.895 : 693.2
Tipovoi proekt otdel'no stoiashchego kirpichnogo ubezhishcha II kategorii na 150 mest [model project for surface brick shelter, category II, for 150 persons]. *&c.*
13″ × 10½″. 16 pp. Moscow & Leningrad: Izdatel'stvo Narkomkhoza RSFSR. 1943.
699.895 [694 + 691.41]
Tipovoi proekt otdel'no stoiashchego derevo-zemlianogo ubezhishcha II kategorii na 150 mest [model project for wood and earth surface shelters, category II, for 150 persons]. *&c.*
13″ × 10½″. 16 pp. Moscow & Leningrad: Izdatel'stvo Narkomkhoza RSFSR. 1943.
—Presented by the Director of the Dept. of Special Works of the Academy, through the (British) Ministry of Information.

699.895 : 72.025.1 arch file

MINISTRY OF WORKS 699.895 : 72.025.1] 728 (42.1) : 69.059.2
Repair of war damage in London. [Houses. Need for concentration of industry.] (Sept. 30. [Printed Sept.])
leaflet. 8¼″ × 6½″. 1944. R.
Enclosing Registration of building and civil engineering contractors *&c.* [return]. (B.C.E./WDR.) [Printed Sept.] [Same.]
[Same: variant wording.] (Sept. 30. [Printed Oct.])
leaflet. 8¼″ × 6½″. 1944. R.
Enclosing [as above]. (B.C.E./WDR (O).) [Printed Oct.]

TOPOGRAPHY

SMITH (R. A. L.) 91 (42.38 B)
Bath.
8½″. 118 incl. viii pp. + pls. Lond.: Batsford. 1944. 12s. 6d. R.

PLANNING, RECONSTRUCTION (PHYSICAL AND SOCIOLOGICAL)

71 : 3 (94) + 711 (94) + 69 (94)

ROYAL AUSTRALIAN INSTITUTE OF ARCHITECTS
Wanted! A plan! Post-war development! [Report by New South Wales Chapter of the R.A.I.A.]
10″ × 8¼″. 20 pp. n.p. 1944. R.

TOWN & COUNTRY PLANNING

R.I.B.A. Inf. file 711 (42) [72.08 : 333 (42) + 728.1 (42)
Memorandum on 1. Government White Paper on the Control of Land Use. 2. Town and Country Planning Bill. 3. Housing (Temporary Accommodation) Bill. [2 and 3] Now before Parliament. (By a Committee . . . [on] Government Policy *&c.*)
leaflet. 10″ × 8″. Lond. 1944.
(One copy) *With* covering letter, dupl. typescript.

REGIONAL PLANNING

LOUISIANA, *state*: DEPARTMENT OF PUBLIC WORKS 711.333 (73)
Handbook for parish [i.e., in Louisiana, county] planning. A guide for parish planning boards. By R. H. Odom.
8½″ × 8½″. 121 pp. + 3 maps, 1 folding. Baton Rouge. 1943.
Presented by the Department.

TOWN PLANNING & REPLANNING

711.4—112 (42.43 A)
EAST MONMOUTHSHIRE JOINT TOWN PLANNING COMMITTEE
Borough of Abergavenny. Town planning scheme. Civic survey. M. E. Taylor *&c.*, planning officer.
Part(s) ii & iii.
dupl. typescript. 13″. 1943.
Presented by Mr. B. A. P. W. Lewis [*A.*].
Part i, 1942, already in Library.

WILLIAMS-ELLIS (CLOUGH) Inf. file 711.4—162 (42.47 B)
Borough of Bewdley [Worcs.]. Draft town planning report.
dupl. typescript. 13″. 1944.
Presented by the Author [*F.*].

Drawings box
711.4—162 (42.64 K)
[EAST SUFFOLK JOINT PLANNING COMMITTEE]
Parish of Kessingland planning scheme. Report of county planning officer . . . 1943.
dupl. typescript. 13″. [1943.]
Presented by the Committee.

ADSHEAD (S. D.) 711.4—163
New towns for old. (Design for Britain, second series, 24.)
pam. 8½″. Lond.: Dent. 1943. R.

DALE ([T.] LAWRENCE) 711.4—163 (42.57 O)
Towards a plan for Oxford city.
8¾″. 60 + (viii, on pls.) pp. + front. + ix pls. (1 double).
Lond.: Faber & Faber. 1944. 6s. R.

CHAPMAN (W. DOBSON) 711.4—163 (42.71 M)
A New Macclesfield. A suggestion for a new town centre. Planned by W. D— C—, *&c.*, *cover title.* (Macclesfield *borough.*)
pam. 11¼″ × 8¾″. Lond. 1944.
Presented by the Author, P.P.T.P.I. [*L.*].

EDWARDS (A. TRYSTAN) 711.417 (42)
A Hundred new towns? (Design for Britain, second series, 36.)
pam. 8½″. Lond.: Dent. 1944. R.

GARDENS

Inf. file 712.21
INSTITUTE OF PARK ADMINISTRATION, *Inc., London*
Post-war planning and reconstruction. As visualised by the I— *&c.* (Journal of Park Administration.)
11¼″ × 8¾″. Lond.: the Journal, Lennox Ho., W.C.2, for the Institute. [1944 or earlier.] *Presented.*

EDLIN (H. L.) 712.41 : 634 (41/42)
British woodland trees.
8½″. ix + 182 pp. + pls. Lond.: Batsford. 1944. 12s. 6d. R.

OLDER WORKS

Presented by Her Majesty Queen Mary (Mediæval sculptures at Winchester College, *by* Sydney Pitcher).

Presented also by—

Miss G. F. Arnot (special number of a periodical).
Baptist War Damage Commission, Surveyor.
Miss J. O. S. Elgood, from the library of her uncle, the late Geo. S. Elgood, R.I. (34 works, including 25 early works).
Mr. John Gloag.
Mrs. Montgomery, C. R. Cockerell's great-granddaughter (MS. Address of the R.I.B.A. to Cockerell, 1862).
Executors of Mrs. Henry Noel (1, early work).
Dr. William Norbury, through Miss Solly (*Secy., A.B.S.*) (2).
Mr. W. Adam Woodward.
Presented anonymously.

Purchased (2, 1 on wall-paper; also 5 old books).

DRAWINGS

Water-colours (2): *Carnarvon Castle; Dubrovnik* (*Ragusa*) *from harbour. By E. C. Bewlay.*
Bequeathed by the Artist [*F.*].

Obituary

ARTHUR T. BOLTON, F.S.A. [*F.*]

WALTER GODFREY AND HOLLAND W. HOBBISS

Mr. Walter Godfrey writes:—

Arthur Bolton, scholar and architect, received his dismissal from his labours at the moment when he had triumphantly placed the coping-stone on a work that had occupied him for twenty years. The leading article in *The Times* that hailed the twentieth and concluding volume of the Wren Society appeared on Saturday, 13 January and accorded its senior editor a well-earned tribute. On Wednesday the 17th he died at the ripe age of 80 years, when still in the full possession of his powers, and indeed meditating further work of architectural research and record.

Arthur Bolton's name will have a large permanent place among those practising architects—not a large band—who have been irresistibly attracted to the academic side of architecture. He had a literary thirst for the detail of architects' lives, their education, their friendships, their travels and the circumstances of their work. An exceptionally well informed critic, he neglected nothing in his pursuit of this particular form of erudition. To him, Inigo Jones, Wren and their successors up to Robert Adam, Sir John Soane and Sir Charles Barry were constant companions, and their works were his continual study.

It was therefore fitting that he should be Curator of the Soane Museum, to which Emerson likened England, a *multum in parvo*, "well packed and well preserved," a treasure house of significant material for the architectural historian.

Bolton was articled to Sir R. W. Edis and gained his early experience and taste under Ewan Christian and Phené Spiers. He travelled widely and started practice in London on his own account two years after his election to the Associateship of the R.I.B.A. in 1888. He won the Soane medal in 1893 and the Essay in 1895. From 1901 to 1903 he was master of the Architectural Association Day School. In 1909 he became a Fellow of the Institute and in 1914 of the Society of Antiquaries. In 1917, on the death of Walter Spiers, he was appointed to the Soane Museum, an appointment he has held for 28 years. In 1918 he was elected to the Council of the London Topographical Society, resigning in 1927.

Bolton's chief contributions to architectural history relate to the brothers Adam, Sir John Soane and to Sir Christopher Wren. In 1922 he published in two folio volumes *The Architecture of Robert and James Adam.* Drawing upon the important collections made by Soane he was able not only to illustrate fully the remarkable work of the brothers but to relate it to the people and the social background of the late 18th century. Despite its detractors the Adam style remains a contribution of outstanding merit to English architecture, and Bolton did a great service in presenting so vivid and well documented a record.

Soane and his museum are interpreted for us by a number of useful volumes which contain the combined products of Bolton's research and judgment. *The Works of Sir John Soane* (1924) and *The Portrai of Sir John Soane* (1928) are the two most valuable books on the founder, and the illustrated *Description of the House and Museum* is packed with information about this astonishing collection. Many other useful volumes give sidelights on Soane and his work.

When the Wren Society was formed after the bicentenary celebrations of 1923 Arthur Bolton and H. D. Hendry undertook the editing of this great memorial to our national architectural hero. Something was known of the available material, but Bolton determined to exhaust every possible source so that all the surviving evidence of Wren's work should be brought together. His persistence was rewarded by many discoveries, and we now have in twenty quarto volumes, produced with all the skill of the Printer to Oxford University, every known drawing of Wren's and every relevant record that may assist us in assessing his work. It was a job after Bolton's own heart, but it was a long and arduous task and it was no small achievement to preface

and publish a yearly volume of this character for twenty years without a break.

Bolton never lost his interest in everything architectural. The meetings of Trustees at the Soane became informal exchanges of information on architectural history, and with his annual report the Curator generally coupled some little thesis of his own. In the year before war the writer found himself, without design, in the same hotel at Dieppe as Bolton and shared with him the last (and most modest) of his continental travels. Even then he was busy taking measurements of Normandy churches, for "why visit a building," he said, "if you do not note it?" With him, as with all genuine students, the past lived in the present, and to the octogenarian the time complex had assumed a minor significance.

Bolton's architectural practice was not large but his work was fastidious and scholarly. He designed St. Stephen's Schools, Bayswater; Ingram House, Stockwell; the P. & O. offices, Cockspur Street; and restored Chandos House, beside other domestic work in the country.

Mr. Holland W. Hobbiss [*F.*] **writes:—**

In the spring of 1902 I entered Arthur Bolton's office in the Sanctuary, Westminster. I was with him three and a half years. Since then we have been in constant touch. For more than thirty years we have corresponded every other week. It is because of this intimate association I find it difficult in a short article to convey the qualities which made him so great a student of architecture.

Arthur Thomas Bolton was the second son of Thomas Bolton, solicitor of the Sanctuary, Westminster, and Emily Wildman, whose home was Chilham Castle, Kent. He was educated at Haileybury and articled to R. W. Edis, F.S.A., in 1884. He later acted as Clerk of Works for Ewan Christian on a church at Folkestone and started his own practice in 1890. Before doing so he had a nine months' tour in Greece and Italy. He was a Soane medallist in 1893, and then visited France and Spain. He won the R.I.B.A. Essay medal in 1895. These were his academic accomplishments, but he never ceased to be an earnest student of the practice and art of architecture. By his sudden death on 17 January the profession has lost an architectural scholar of high distinction, as *The Times* leader described him. He had a retentive memory stored with what he read, but most of all from what he saw. He would march through a building talking all the time comparing its plan and details with other similar buildings and criticising, adversely or otherwise, as the theme struck him. He was a thorough Londoner and never happier than when wandering through its parks and streets with one who would listen to his amazing knowledge of the buildings and of the architects, known and obscure, who created them.

It was the Classic tradition he most admired and most enjoyed studying and writing about. He understood the orders, not as pedantic details but as the language of architecture to be used in varied and cultured composition to clothe the structure they were intended to beautify. He was particularly attracted by the construction and use of domes, and this led to his well-known pamphlet on "The Dome as the basis of Architectural Style." He had a way of dissecting a building with the same thoroughness as a medical student does the human body. With no better measuring rod than an umbrella and a two-foot rule he would stride up and down the buildings which attracted him and extract from them the information he required. Among his sketch books and papers can be seen plans, sections and elevations of cathedrals, palaces, piazzas, etc., drawn out from dimensions taken in this way, and sufficiently accurate for the purposes of reference.

This analysis and searching out of principles of design, a gift that few possess and none to a greater degree than did Bolton, gave him immense knowledge, not only of buildings, but of architects and their methods, and enabled him to speak authoritatively of their work—as he did of such men as Wren, Vanbrugh, Wyatt, R. and J. Adam, and Soane, and as far as I know his deductions have not been refuted.

He was a delightful companion. Many happy days have I spent with him and his family at Birchington-on-Sea, where he had built himself a house on the cliff. He had something of the poet in his nature and loved the sunlit yellow sands stretching away towards the twin towers at Reculvers and the blue sea with its mystic sails, and the sky, pink like the inside of a sea shell. The description is his, not mine.

Sometimes the whole family—there were five children—and visitors would mount bicycles and ride to Canterbury, twelve miles away. It was a whole day's outing as there was the Moot Hall to see at Ford, a house at Sarre and quite a number of delightful flint and brick cottages to inspect. When we did at last arrive at Canterbury the ladies went shopping, the children played in the Close and he and I wandered around the Cathedral, he talking about its history, its construction, its plan and of its composition as a whole. He never worried about dates or periods; it was always the composition as a whole he considered.

His executed works were small in number as compared with contemporary architects. A Church Day School, a Hostel for Public School Boys at Stockwell, a new entrance hall and restorations at the Royal Society of Arts in Adelphi, offices for the Hamburg-Amerika Line, for the Allan Line in Leadenhall Street and for the P. & O. Steamship Company in Cockspur Street, a few country houses, one at Virginia Water, another at Ewhurst, Surrey, were some of the most important. He altered or restored several authentic Adam houses for clients who were familiar with his great books on Robert and James Adam. He designed the Adam room in the Wembley Exhibition, 1923, which attracted a good deal of attention. His work was always interesting, scholarly and refined, and his planning of houses was always good. He had a flair for colour decoration which made his interiors pleasant and attractive. His great traditional knowledge did, to some extent, cramp his style; rightly or wrongly, he would not allow himself the freedom practised by others.

It was his writings and books that gave him a distinction unique even among scholarly architects. The following are his more important works, the chief titles in a long list which includes many pamphlets and contributions to learned journals: The Gardens of Italy (1919), the Architecture of Robert and James Adam (2 vols., 1922), a portrait of Sir John Soane and other volumes in the series of Soane Museum publications, and, finally, the twenty volumes of transactions of the Wren Society, which he completed with the help of Mr. Hendry—a stupendous work of international importance. No future author writing about Sir Christopher Wren dare do so without studying the transactions, for he will find every brick, stone, oaken beam or leaden roof which the great architect ever used there accounted for.

When that great work was finished, Arthur Bolton laid down his pen and pencil and passed on, leaving us richer for his life and work.

DAVID THEODORE FYFE [*F.*]

Most members have by now learned of Mr. Fyfe's sad and sudden death in a skating accident near Cambridge on New Year Day in his seventieth year. Mr. Fyfe was a scholar of distinction, whose association with Mediterranean archaeology and architecture dated from 1899, when he won a travelling studentship from the Architectural Association School. This took him to Greece early in his career, and in recent years his interest in Mediterranean studies was given renewed opportunities of expression by the award to him of the first R.I.B.A. Henry Florence Bursary in 1932-3.

Theodore Fyfe was born in the Philippine Islands in 1875, the son of James Sloane Fyfe of Manila. He came to England and, after receiving his education at Albany Academy, Glasgow, became articled to Sir (then Mr.) John Burnet. After a time in Burnet's office, he moved to the Architectural Association School in London, whence he obtained the Scholarship which took him to Greece in 1899. He joined the British School in Athens and in 1900 became a member of Sir Arthur Evans's team as architect to the Cretan Exploration Fund, then engaged on its first "digs" at Knossos. Fyfe worked with Evans until 1904, and for a long time after retained a close association with Cretan archæological work.

Back in England, Fyfe went again into Sir John Burnet's office, working for the firm and on his own account in London, where he designed the Shaftesbury Institute in Lisson Grove. Other buildings by Fyfe are the hall and classrooms of the Charlotte Mason College, Ambleside, work in Chester Cathedral, the Memorial Chapel at Ashton Hayes near Chester, and the Science Block at Chester Training College. He also built houses in Cambridge and elsewhere.

He held various architectural appointments. He was architect to the Dean and Chapter of Chester Cathedral, and Director of Excavations at Glastonbury for a year in 1926-7. He was at one time Ministry of Health architect at Queensferry.

Since the last war Fyfe's principal work was as a teacher. In 1922 he was appointed Master and later Director of the newly-established School of Architecture at Cambridge, and remained head until 1936, when he was succeeded by Mr. James Macgregor. In latter years he retained a close interest in the School's affairs, and remained as a lecturer. In Cambridge he took an active part in the work of the

Cambridge Preservation Society, and of the Council for the Preservation of Rural England.

Fyfe contributed largely to journals on the excavations at Knossos and on Greek and Hellenistic architecture, writing many articles for the R.I.B.A. The most important were *Greek Studies* (Vol. 27, p. 461), *Painted Decoration at Knossos* (Vol. 10), an article illustrated in colour following a general review of the excavations by Evans, and *Some Aspects of Greek Architecture* (Vol. 21, p. 498), a paper read to the Manchester Society of Architects.

In 1936 The Cambridge Press published Fyfe's *Hellenistic Architecture*, a volume based on his Henry Florence Fellowship studies, and in 1942 The University Press also published a small volume, illustrated by himself, on the *Architecture of Cambridge*, and at the time of his death he was engaged on another book to be called *The Little Country Church*.

Fyfe served at various times on R.I.B.A. Committees, and for many years was a member of the Literature Standing Committee.

SYDNEY PERKS, F.S.A. [*F*].

Sydney Perks, in spite of his many years as an official, retained an agreeable frankness. His career shows his exceptional versatility. A pupil of T. H. Watson, an architect who combined private practice with the holding of an appointment as district surveyor for a part of Westminster, Perks first came before the public as the author of works on "Party Structures, and on Dilapidations." In 1905 there was published his important book on "Residential Flats." Although no second edition appeared, it will be seen from the copies in the Institute Library that this work was continuously consulted until the Munich crisis and the fear of war put a brake on building development. On now glancing through it one is struck with the care taken in its preparation, the number of Continental examples given, and the fact, stated in the preface, that the author went to Edinburgh to examine the flats there erected during the sixteenth and seventeenth centuries. One is struck also by the way in which he anticipated in flat design some of the views now current on sound insulation, and by the wide reading which enabled him to quote Seneca on fire escape from high buildings.

Appointed in 1904 as City Surveyor, and responsible, on taking up this appointment, for the day to day administrative decisions in regard to the extensive property of the Corporation of London, and acting also as architect for most of its building operations, he turned for interest to historical studies in connection with London, and published works on "The History of the Mansion House," "Essays on Old London," and, after his retirement, "The Water Line of the City of London after the Great Fire." Appreciation of his interest and researches in these matters was shown by his election in 1908 as a Fellow of the Society of Antiquaries.

Perhaps the most notable mark left by him in the City was in connection with the main portion of King William Street, between Cannon Street and the Bank, where on the leases falling in of the original buildings, some forty in number, the City Corporation, on his advice, arranged for the re-development in less than a dozen large building sites. There was some criticism of such large scale site-planning, as being too venturesome, but it was justified by the result, the sites being soon taken up and buildings erected.

Reference is made in the note below to his work on various committees and on the Council of the Institute. But in our democratic way of life there is an appreciation of the value of an opposition, and these notes would be incomplete if mention were not made of his opposition to certain proposals in 1921-1922 in connection with the absorption of the Society of Architects. A dilution of the Associate class was then feared, perhaps unreasonably, by some, and Perks was a strong opponent.

Speaking of his appointment as City Surveyor he had the candour to state, among his friends, that he was astonished at the result of his application, as he had no influence, and this at a time when it was more necessary as an aid to high appointment than at present. In some ways it was regrettable that, with his energy and ability, he was lost to private practice. With his temperament, the harness of officialdom must have chafed him on many occasions. One instance occurred in 1930 just before his retirement, when, because of the world-wide depression, public expenditure was being cut in all directions. He had prepared a scheme for extensive alterations at the Mansion House, and had the annoying experience of having his specifications sat on and cut down by a committee. After 25 years of official life he did not appear to regret his retirement, and he was more fortunate than some in the number of years given him to enjoy it.

H. C.

Correspondence

"LINTOL" AND "CILL"

The Editor, THE JOURNAL R.I.B.A.

SIR,—May I refer to Mr. Allen Foxley's letter relating to the spelling of these words in the JOURNAL of November last.

The Standards Committee and the Directorate of Post-war Building of the Ministry of Works have made repeated efforts to have "lintel" and "sill" used correctly in all publications with which they are in any way connected. "The Use of Standards in Building" and "The Housing Manual 1944" may be cited as examples.

It is also believed that the Study Committee Reports have adopted the correct spelling throughout.

I am, Sir,

Your obedient Servant,

SYDNEY TATCHELL,

Chairman, M.O.W. Standards Committee.

A PLEA FOR "NATURAL" SCALES

Beechcroft, Heathside Road, Woking, Surrey.

8 January 1945.

The Editor, THE JOURNAL R.I.B.A.

SIR,—With so much long-term reconstruction now being planned, may I put in a plea for the use of "Natural" scales by all concerned, in Britain, with physical planning and structural design?

A scale of, say, 1/200, can instantly be related both to feet and metres as well as to any other sub-division of space in local use. In other words, a universal plan-language is instantly established. This helps to put physical reconstruction on a world-wide rather than on a parochial basis and to increase the understanding between all architects and engineers, irrespective of race and language.

It also, incidentally, irons out some of our redundancies such as the dual use of 1/500 and one inch to 44 feet (1/528); and it establishes clearly defined relationships between all the different scales and between each scale and the full-scale plan or structure.

The alterations in the scales which a British architect uses every day in designing a building (1/16 in., $\frac{1}{8}$ in., $\frac{1}{4}$ in. and $\frac{1}{2}$ in.) are very small indeed.

Here is a list of 21 scales with which we, in Britain, have normally to wrestle, together with 13 "natural" scales that would generally cover requirements :—

Existing	*Proposed*
1″ to a mile (1/63,360)	1/50,000
6″ to a mile (1/10,560)	1/10,000
1/2,500	1/2,500
1/1,250 —	1/1,000
1″ to 88 feet (1/1,056) —	
1″ to 44 feet (1/528)	
1/500	1/500
1″ to 40 feet (1/480)	
1″ to 32 feet (1/384)	1/400
1″ to 22 feet (1/264)	
1″ to 20 feet (1/240)	1/250
1″ to 16 feet (1/192)	1/200
1″ to 10 feet (1/120)	
1″ to 8 feet (1/96)	1/100
1″ to 4 feet (1/48)	1/50
$\frac{3}{8}$″ to a foot (1/32)	
1″ to 2 feet (1/24)	1/25
$\frac{3}{4}$″ to a foot (1/16)	1/20
1″ to a foot (1/12)	
One-tenth full size (1/10)	1/10
$1\frac{1}{2}$″ to a foot ($\frac{1}{8}$)	

This is, of course, no new idea and may—I hope—already be in serious contemplation. Except for some of the Survey scales (and most Surveys must be revised soon after the war) it could be put into effect without delay.

Yours faithfully,

GRAHAM DAWBARN [*F.*].

Notes

R.I.B.A. Diploma in Town Planning

At the examination held in July 1944 the following were successful and have been awarded the R.I.B.A. Diploma in Town Planning :—

Aldred, Douglas Winston.
Caldwell, James Edwin Lees.
Lamb, Antony R.
Reekie, R. Fraser.

The following candidate having previously passed the examination conducted by the Town Planning Joint Examination Board, has gained approval for the requisite probationary work and has also been awarded the R.I.B.A. Diploma in Town Planning :—

McKee, James A. Roy.

The R.I.B.A. Intermediate Examination, November 1944

The R.I.B.A. Intermediate Examination was held in London, Manchester, Leeds, Edinburgh and Belfast from 10 to 16 November 1944.

Of the 124 candidates examined, 41 passed and 83 were relegated. The successful candidates are as follows :—

Andrews, Cyril G.
Bird, Paul B.
Blastland, William C.
Bond, (Mrs.) Mary B.
Bowes, Joseph (subject to approval of remaining Testimonies of Study).
Boyer, E. Stanley.
Brown, David.
Brown, James H. C.
Cooper, Raymond (subject to approval of remaining Testimonies of Study).
Crockett, W. G. M.
Denniss, Gordon K.
Dickie (Miss), Christian I.
Elliott, Leonard W.
Evans, Philip C.
Farquhar, James A.
Feast, Douglas O.
Grant-Nelson, A. W. Mackay.
Gray, Percy.
Harrington, Roy.
Harvey, William J.
Higgins, James H.
Johnson (Miss), Elizabeth M.
Kenning, Raymond W.
Kington, Norman D.
Knight, William.
Lavender (Miss), Joan C.
Mathias, Peter.
Maw, Phillip G.
Measday, Clifford M.
O'Leary, Brian, J. F.
Pearson, Ronald L.
Poole, Ralph S.
Porter, Samuel H.
Robson, Kenneth L.
Thomas, Harries.
Wakefield, Victor H.
Waters, George A.
Westaway, Eric M.
Winter, Douglas.
Wood, Cyril R. M.
Woodford, Charles A.

Codes of Practice Committees

The R.I.B.A. representatives on the three Codes of Practice Committees convened by the R.I.B.A. on behalf of the Main Codes of Practice Committees are as follows :—

External Walling and Internal Walls and Partitions.

J. Alan Slater [*F.*] (chairman), Stanley A. Heaps [*F.*], H. Duncan Hendry [*F.*], Alister MacDonald [*F.*], Lionel G. Pearson [*F.*], R. Wakelin [*A.*].

Weather Resisting Roof Coverings.

G. Fairweather [*F.*] (chairman), Austin Blomfield [*F.*], Victor Heal [*F.*], C. W. Hutton [*A.*], Colin Lucas [*F.*].

Finishings.

H. V. Lobb [*F.*] (chairman), Ewen S. Barr [*F.*], J. Murray Easton [*F.*], O. Howard Leicester [*F.*].

The Building Centre and No. 9 Conduit Street

For the past few years the Building Centre has occupied the old R.I.B.A. Meeting Rooms which led off No. 9 Conduit Street. Now, with a great increase in demand on the Centre's services certain after the war, the directors have taken over the whole of the old R.I.B.A. building and will have their main entrance in No. 9 Conduit Street.

The rooms of No. 9 are to be converted for the Centre's use and will be brought into use as soon as possible.

Brazilian Institute Diploma for Mr. J. H. Forshaw

The Brazilian Institute of Architects have granted a diploma to Mr. J. H. Forshaw [*F.*] as an honorary corresponding member.

The award has been made in recognition of Mr. Forshaw's work in connection with the plans for the rebuilding of London.

NOTES FROM THE MINUTES OF THE COUNCIL

16 JANUARY 1945

Housing Production.

The Council approved a recommendation of the War Executive Committee that a selected number of members should be invited to attend a conference " to consider and report to the Council upon the problems involved in implementing the promise of the Government to produce four million houses in ten years, and the repercussions on the Architectural Profession." It was also agreed that the Conference should be authorised to set up, if thought desirable, a small *ad hoc* Committee to examine the matter in detail, the membership of which should be drawn from those invited to attend the Conference, together with such other persons as the Conference may think fit to appoint.

The Carrying Out of War Damage Work in the London Area.

The Hon. Secretary reported that a memorandum prepared by a Joint Committee of representatives of the R.I.B.A. and the Chartered Surveyors' Institution on the carrying out of war damage work in the London area and the effects of the £10 licence limit, together with a memorandum setting forth proposed revisions to the War Damage Commission's Code of Professional fees, had been submitted to Sir Malcolm Trustram Eve, chairman of the War Damage Commission.

Employment of Architects by County War Agricultural Committees.

It was reported that, on the instructions of the War Executive Committee, a letter had been forwarded to the Minister of Agriculture and Fisheries suggesting that he should urge County War Agricultural Committees to employ qualified architects to supervise all agricultural building work.

New Council of Industrial Design.

It was reported that the attention of the War Executive Committee had been drawn to the recent appointment of a new Council of Industrial Design, the membership of which contained no architect, and that the President had undertaken to write to the President of the Board of Trade suggesting that one or more architects who had specialised in Industrial Design should be added to the new Council.

Report of Committee on the Architectural Use of Building Materials.

It was reported that the Report of the Committee on the Architectural Use of Building Materials had been amended by the Committee in the light of comments received from trade interests to which it had been circulated by the Ministry of Works, and that the Final Report had now been forwarded to the Ministry for publication.

The Design of Post-war Ordnance Survey Maps.

It was reported that, following a request from the Ordnance Survey Office for criticism of specimens of maps which it is proposed to produce in their post-war programme, a Sub-Committee of the Central Planning Advisory Committee had examined the maps submitted and that their comments had been forwarded to the Director-General of the Ordnance Survey Office, from whom a letter of thanks had been received.

Obituary.

The Acting Secretary reported with regret the death of the following members and Student :—

Blakeley Rinder Gribbon [*F.*] (R.I.B.A. Architecture Bronze Medallist for West Yorkshire, 1931).
Mr. Gribbon was a past member of the Council and the Allied Societies' Conference and a past President of the West Yorkshire Society of Architects.
Alfred Arthur Cox [*Retd. F.*] (Grissell Gold Medallist, 1886, Godwin Bursar, 1890).
Arthur Charles Alfred Norman [*Retd. F.*].
Mr. Norman was a past member of the Council and the Allied Societies' Conference and a past President of the Devon and Cornwall Architectural Society.
Archibald Alastair Vivian Campbell [*A.*].
John Frederick Duthoit [*A.*].
Thomas McGill Cassels [*L.*].
Francis Rogers Pratt [*Student*]. Killed on active service.
Messages of sympathy have been conveyed to their relatives.

Membership.

The following members were elected :—

As Fellows : 4.
As Associates : 6.
As Licentiates : 7.

Election February 1945.

Applications for election were approved as follows :—

As Fellows : 8.
As Associates : 8.
As Licentiates : 19.

Electio[illegible] May 1945.
One [illegible]plication for election as a Fellow and one application for election [illegible]s an Associate from overseas candidates were also approved.

Reinsta[illegible]ements.
The f[illegible]llowing ex-members were reinstated :—
As Fellows : William Arthur Banks.
Stuart Bentley.
William Stanley Grice.
As Associates : James Hugh Bolton.
Walter Edward George Coker.
Elidir Leslie Wish Davies.
William Michael Tracey Parsons.
Norman Ernest Godfrey Weston.
As Licentiate : Percy George Overall.

Resign[illegible]tion.
The f[illegible]llowing resignation was accepted with regret :—
Rupert Claude Austin [*A.*].

Applic[illegible]tions for Transfer to the Retired Members' Class under Bye-law 15.
The f[illegible]llowing applications were approved :—
As Retired Fellows : David Aitken McCubbin.
George Nott.
As Retired Licentiates : Edward Attree.
Frederick John Ward.

Membership Lists

NOTE

In the January Journal the name of *Mr. F. A. C. Maunder* appeared as a candidate for election as a Fellow on the 13th February and he was incorrectly referred to as Deputy City Architect, Portsmouth. The description should have been "*City Planning Officer and Reconstruction Architect, Portsmouth.*"

ELECTION : 16 JANUARY 1945

The following candidates for membership were elected on 16 January 1945 :—

AS FELLOWS (4)

BROOKE : DONALD [*A.* 1924], Liverpool.
DAVIES : EDWARD FOULKES, B.Arch. (Liverpool) [*A.* 1928], Aberdeen.
HOARE : ERIC LESTER TREADAWAY [*A.* 1936].
WARD : RONALD, Major R.E. [*A.* 1937].

AS ASSOCIATES (6)

FARROW : GEOFFREY DENIS, Seaham.
HUNT : NORMAN HABGOOD.
MARQUIS : MISS FRANCES MARY, Birkenhead.
MURRAY : JOHN OLIVER BENEDICT, B.Arch., Dublin.
PARKER : WILLIAM NORMAN, B.Arch. (Liverpool), Sheffield.
YARROW : ALFRED RICHARD, Capt.

AS LICENTIATES (7)

AUSTIN : HORACE JOHN MINARD.
BRERETON : JOHN, Bebington.
HEATH : RALPH LESLIE.
INGRAM : DAVID ERIC MAJOR, Major R.E.
MILLINGTON : ARTHUR HENRY.
TAGGART : REDMOND THIBEAUDEAU, Commander R.N.V.R., Belfast.
WAITE : ALWYN, Wakefield.

ELECTION : 13 MARCH 1945

An election of candidates for membership will take place on 13 March 1945. The names and addresses of the candidates, with the names of their proposers, found by the Council to be eligible and qualified in accordance with the Charter and Bye-laws are herewith published for the information of members. Notice of any objection or any other communication respecting them must be sent to the Secretary, R.I.B.A., not later than Saturday, 10 March 1945.

The names following the applicant's address are those of his proposers.

AS FELLOWS (3)

DEVEREUX : WALTER ALAN, A.A.Dipl. [*A.* 1923], Ministry of Town and Country Planning, 32 St. James's Square, W.1 ; The Moorings, Tadworth, Surrey. A. F. B. Anderson, J. M. Easton and A. W. Kenyon.

GEESON : ALFRED GODWIN [*A.* 1924], Wolverhampton and Staffs. Technical College ; 14 Uplands Avenue, Wolverhampton. E. J. Williams, A. F. Bryan and William Keay.

HYSLOP : CHARLES GEDDES CLARKSON, A.A.Dipl. (Major R.E.) [*A.* 1924], 6 Endsleigh Place, W.C.1. Howard Robertson, G. A. Jellicoe and J. M. Easton.

AS ASSOCIATES (5)

The name of a school or schools after a candidate's name indicates the passing of a recognised course.

EGLIN : HENRY JAMES, Dip.Arch. (Univ. of Liverpool), 47 Primrose Drive, Huyton, Liverpool. Prof. L. B. Budden, L. H. Keay and J. E. Marshall.

FOGEL : JOSEPH GERALD, Dip.Arch. (The Poly., Regent Street, London), 14 Kingsgate Avenue, Finchley, N.3. E. C. Scherrer, T. H. Hughes and L. A. Chackett.

JAQUES : CLIFFORD SYDNEY (The Poly., Regent Street, London), 31 Middleton Road, Shenfield, Essex. E. C. Scherrer, T. H. Hughes and L. A. Chackett.

SMITH : HARRY THOMAS DONALD [Final], Pear Tree, Wakeley Hill, Penn, Wolverhampton. L. S. Stanley, George Checkley and H. O. Corfiato.

WILLS : GERALD [Final], The Square, Midsomer Norton, Nr. Bath, Somerset. G. D. G. Hake, Sir George Oatley and J. N. Meredith.

AS LICENTIATES (15)

CARLIN : WILLIAM FRANCIS, 56 Chapel Road, Waterside, Londonderry. Applying for nomination by the Council under Bye-law 3 (*d*).

DEAN : EDWARD GEORGE, Regent Hotel, Leamington Spa : 15 Percy Street, Stratford-on-Avon. F. Q. Farmer, J. W. Spink and Frankland Dark.

CLARK : JOHN, S/Sgt. R.E., formerly c/o H. C. Ashenden [*F.*], 23 Watling Street, Canterbury, Kent ; 41 Woodnesborough Road, Sandwich, Kent. H. C. Ashenden and the President and Hon. Sec. of the S.E.S.A. under Bye-law 3 (*a*).

DICKINSON : GEORGE GOLBORNE, City Engineer and Surveyor's Town Planning Department, Municipal Buildings, Dale Street, Liverpool, 2 ; 54 Fielding Crescent, Blackburn. Walter Stirrup, W. H. Harrison and Lieut.-Col. Ernest Gee.

GALLANNAUGH : REGINALD HORACE, 31 Cross Street, Burnham-on-Sea, Somerset. B. W. L. Gallannaugh, John Clarke and Julian Leathart.

GARDINER : JOHN FREDERICK, Architect's Department, L.C.C., County Hall, S.E.1 ; 57 Dysart Avenue, Kingston-upon-Thames. Edwin Williams, R. Wilson and J. Auty.

GREGORY : GLYN LANGTON, 21 Promenade, Cheltenham Spa : "Glenfalls," Coberley, near Cheltenham Spa. A. J. Hardwick, S. P. Anderson and Frederick Barber.

HARMAN : ERNEST GEORGE, 50 Pembroke Road, Clifton, Bristol, 8 ; 12 Victoria Square, Clifton, Bristol, 8. P. B. Rigg, Major C. W. B. Bolton and C. G. Skinner.

JONES : SYDNEY HOWARD, Public Works Department, Council House, Birmingham ; "Glenarden," 5 Blossomfield Road, Solihull, Warwickshire. J. B. Surman, A. J. Hope and C. F. Martin.

KITCHEN : FRANCIS WHITEHURST, C.E. in C.'s Department, Admiralty, Leeds, 1 ; 166 Harehills Avenue, Leeds, 8. Applying for nomination by the Council under Bye-law 3 (*d*).

SPURGEON : ERNEST ATKINSON, Borough Architect's Department, College Street, Keighley, Yorks ; "Meadowcroft," Long Lee, Keighley, Yorks. The President and Hon. Sec. of the West Yorks S. of A. under Bye-law 3 (*a*) and applying for nomination by the Council under Bye-law 3 (*d*).

TONNER : JOHN, Messrs. Stewart, Tough & Alexander, Hamilton Street, Greenock ; "Ascog," Denholm Terrace, Greenock, Renfrewshire. J. A. Coia, W. J. Smith and Wm. Salmond.

WALTER : JOHN FELIX, New Rectory, Dallinghoo, Woodbridge, Suffolk. A. H. Moberly, J. A. Slater and C. S. White.

WINKLESS : EDWARD WILLIAM, 25 Lapstone Gardens, Kenton, Harrow, Middlesex. J. R. Young, D. E. Harrington and Thomas Spencer.

WRIGHT : WILLIAM FREDERICK, Tregeare, Upper Court Road, Woldingham, Surrey. F. T. Dear, J. M. Sheppard and W. B. Stedman.

ELECTION : 19 JUNE 1945

An election of candidates for membership will take place on 19 June 1945. The names and addresses of the overseas candidates, with the names of their proposers, are herewith published for the information of members. Notice of any objection or any other communication respecting them must be sent to the Secretary, R.I.B.A., not later than Saturday, 26 May 1945.

The names following the applicant's address are those of his proposers.

AS ASSOCIATES (2)

BALDWINSON : ARTHUR NORMAN (Passed a qualifying Exam. approved by the R.A.I.A.), 2 Horsburg Grove, Armadale, S.E.3, Victoria, Australia. P. H. Meldrum, L. M. Perrott and Leighton Irwin.

LEE : WILLIAM LAMBERT (Passed a qualifying Exam. approved by the R.A.I.A.), 73 Bendigo Street, S.1, Melbourne, Australia ; 18 Well Street, Loose, Maidstone, Kent, England. J. F. D. Scarborough, L. M. Perrott and C. E. Serpell.

Competitions

A FARM BUILDINGS COMPETITION : R.I.B.A. ADVICE

The attention of the Competitions Committee has been called to the particulars of the competition for farm buildings published in *The Farmer and Stock-Breeder* of 9 January.

Some time previous to the publication of these particulars the officers of the Competitions Committee had discussed with the promoters the possibility of framing conditions for the competition which would conform to the R.I.B.A. Regulations. Unfortunately the promoters have not been able to adopt these suggestions, but as the competition is not confined to architects, the Competitions Committee do not think it necessary to issue the formal notice warning members not to take part. Members will decide for themselves whether it is worth while for them to enter for the competition, but if they do, they should realise that many of the conditions which normally form part of architectural competitions are not included. For instance, the names of the Jury of Assessors are not stated and the usual safeguards prohibiting members of the staff of the promoters or of the Assessors from competing are not included.

Notices

ASSOCIATES AND THE FELLOWSHIP

Associates who are eligible and desirous of transferring to the Fellowship are reminded that if they wish to take advantage of the next election they should send the necessary nomination forms to the Acting Secretary R.I.B.A. as soon as possible.

THE USE OF TITLES BY MEMBERS OF THE ROYAL INSTITUTE

In view of the passing of the Architects Registration Act 1938, members whose names are on the Statutory Register are advised to make use simply of the title "Chartered Architect" after the R.I.B.A. affix. The description "Registered Architect" is no longer necessary.

BUILDING SURVEYING EXAMINATION

The R.I.B.A. Examination qualifying for candidature as Building Surveyor under Local Authorities will be held at the R.I.B.A. on 2, 3 and 4 May 1945. Applications for admission to the examination must be received not later than 20 March 1945.

Members' Column

APPOINTMENTS

MR. E. W. BERRIDGE, M.A., M.T.P.I. [*A.*], has been appointed Town Planning Officer to the Canterbury and District Joint Planning Committee. His office address is now "Barcroft," 40 New Dover Road, Canterbury.

PRACTICES AND PARTNERSHIPS

MR. A. B. GRAYSON [*F.*], has entered into association with Mr. H. H. Goldsmith, [*A.*]. The practice will be conducted under the style of Grayson & Goldsmith, Chartered Architects, 7 Bridge Street, Bath. Tel. : Bath 4823. MR. A. B. Grayson will resume practice independently in Jersey as soon as possible after the liberation of the Channel Islands.

MAJOR A. J. TOOMER [*F.*] and Mr. E. F. Tew, Dip. Arch. Glasgow, have entered into partnership, and will practice as Toomer & Tew, Chartered Architects, from 3 The Crescent, Taunton. Also at Bath. Telephone numbers : Taunton 2858, Whitchurch 41173.

MR. E. B. MUSMAN [*F.*], has resigned from his temporary war-time appointment as Regional Officer P.A.D. No. 9 (Midland) Region, Ministry of Supply, and has resumed private practice on his own account at 7 Queen Anne's Gate, Westminster, S.W.1.

MESSRS. LUCAS & ROBERTS [*F./A.*] will remove on 1 March from 5 Cathedral Close, Exeter, to the offices of Messrs. J. & H. Drew, 29 Barnfield Road, Exeter, who will undertake the management of the practice until the return of Mr. C. W. Roberts from active service.

ASSOCIATE would like to acquire practice or partnership where principal contemplates early retirement.—Box 9145, c/o Secretary, R.I.B.A.

ASSOCIATE (also chartered surveyor), aged 37, with considerable experience in handling contracts, would like to communicate with practising architect London or South of England with a view to partnership.—Box 1315, c/o Secretary, R.I.B.A.

PARTNERSHIP, in East Anglian market town practice, offered for sale to Registered Architect, to take charge. Vacant flat over office.—Box No. 2615, c/o Secretary, R.I.B.A.

MEMBER [*A.*], P.A.S.I., active and experienced, who anticipates early release from war-time Government appointment, wishes to contact established firm with view to partnership. London or Southern Counties preferred.—Box No. 2715, c/o Secretary, R.I.B.A.

MR. PETER BICKNELL, M.A. [*A.*], has resumed practice at the following temporary address : 40 Regent Street, Cambridge. Telephone Cambridge 3989.

MESSRS. J. W. HANSON & SON, [*LL.*] are re-commencing practice at 123 Northumberland Street, Newcastle-upon-Tyne, 1, and will be glad to receive trade catalogues, etc.

MR. GORDON O'NEILL [*L.*], having completed his war damage work for the Plymouth Corporation, has now resumed his private practice at 65 Springfield Road, Chelmsford.

MR. DUNCAN MCCULLOCH [*L.*] announces that he has acquired on 1 January 1945 the practice of Messrs. Allan Stevenson & Cassels, Chartered Architects and Surveyors, 56 Sandgate, Ayr, and that he will practise at that address under his own name as from that date.

MR. ERNEST ASHWORTH, [*L.*], formerly of 11 Windsor Terrace, The Hoe, Plymouth, has now opened offices at Headland Villas, North Hill, Plymouth, where he will be pleased to receive trade catalogues and to meet representatives.

ON returning from the Far East Mr. A. Lambert [*Student*] would be pleased to receive trade literature at "Beechwood," 31 Henconner Lane, Leeds, 7. Tel. : 44261 Leeds.

ACCOMMODATION

MEMBER vacating his office in the West Central (London) district, is desirous of contacting another Member with an established office, not necessarily in the same district, who is prepared to share accommodation and telephone facilities on agreed terms.—Write Box No. 2812, c/o Secretary, R.I.B.A.

CHANGES OF ADDRESS

QUIGGIN & GEE [*F.F.*] have opened new offices at Harley Buildings, 11 Oldhall Street, Liverpool ('phone Central 8624/5). Their offices at 3 Linden Avenue, Blundellsands, and North House, North John Street, Liverpool, have been closed down.

KEITH MURRAY [*F.*] and C. S. WHITE [*F.*] have changed their address and are now in practice at 32 Wigmore Street, London, W.1. Telephone No. : Welbeck 1409.

Mr. Ronald Chapman [*A.*] and Mr. Raymond Perry have removed their offices to 19 Buckingham Street, Adelphi, W.C.2, and will be glad to receive trade catalogues at that address.

FOR SALE AND WANTED

MEMBER has the following books for sale in excellent conditions :—Architectural Composition, Nathaniel C. Curtis ; Reinforced Concrete Design, Vol. I, Theory, Oscar Faber and P. G. Bowie ; Vol. II, Practice, Oscar Faber.—Reply Box No. 1915, c/o Secretary, R.I.B.A.

MEMBER re-opening practice is anxious to obtain the following :—Copy of Planning by E. & O. E. ; second-hand plan chest and filing cabinet ; also tripod for dumpy level.—Box 1215, c/o Secretary, R.I.B.A.

WANTED by ex-Service member : "Site Planning in Practice" by F. L. Thompson, and "Development of Building Estates" by F. Howkins.—Write to Box 2515, c/o Secretary, R.I.B.A.

MEMBER wishes to purchase "Pelican" drawing pen and/or nibs for same.—Box No. 6245, c/o Secretary, R.I.B.A.

CORRECTION

The address given in a Members' Column notice published in January, "Elderly Fellow requires suitable partner" was incorrect. The proper address to which any further replies should be sent is: 1-3, North Hill Terrace, Plymouth.